MOVING TOWARDS ZERO WASTE IN ADDISON COUNTY

by
Ayesha Dinshaw
Sarah Fortin
Mike Gleason
Devi Glick
Maegan Olivos

Middlebury College
Environmental Studies Senior Seminar
Fall 2006

Led By:
Nadine Canter Barnicle
Diane Munroe

Community Partner:
Addison County Solid Waste Management District

Acknowledgements

This project would not have been possible without the contributions of the following people: Teri Kuczynski, Donald Maglienti, Katie Johnson, Jessica Edgerly, Mark Gleason, Tom McGinn, Mark Tighe, Jack Byrne, Ed Grimley, and Scott Olson. We would also like to thank Diane Munroe and Nadine Barnicle for their patience and guidance throughout the course of this endeavor.

Lastly, we would like to thank the staff at the Middlebury College Library Café for free donuts, loud cappuccino machines, and tables positioned just a little too far away from the electric outlets.

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY 1

1. INTRODUCTION 3

1.1 Zero Waste in the Context of "Healthy Local Communities" 3

1.2 What is Zero Waste and Why Should We Work Towards It? 7

2. SUMMARY AND EVALUATION OF ACSWMD'S CURRENT PROGRAMS 10

2.1 Summary 10

2.2 Evaluation 17

3. ACSWMD GAPS IN DIVERSION – ORGANICS AND C&D 20

3.1 Organics 20

3.2 Construction and Demolition Debris 34

4. OUTREACH 46

4.1 Outreach Plans and Goals 46

4.2 Results 50

5. CONCLUSION 53

Appendix A *- Other Zero Waste programs throughout the U.S. and the world* **56**

Appendix B *– Member municipalities of the ACSWMD* **56**

Appendix C *– Key strategies for communities – summary table* **57**

Appendix D *– Cost analysis of various management strategies for processing organic material* **60**

Appendix E *– Middlebury College Construction and Demolition Waste Management Best Practices* **61**

Appendix F *– Diversion plan for the Hillcrest Project, Middlebury College* **65**

Appendix G *– Main questionnaire* **66**

Appendix H *– Restaurant questionnaire* **73**

Appendix I *– Newsletter article* **80**

References Cited **81**

I. EXECUTIVE SUMMARY

Zero Waste in the Context of "Healthy Local Communities"

We believe that the "Zero Waste" approach offers great potential for working towards more local, sustainable solutions in the sector of resource and waste management at the community level. We recognize the Addison County Solid Waste Management District (ACSWMD) as a district in which significant opportunity for progress towards Zero Waste exists. The objective of this report is to assist the ACSWMD in transitioning to a Zero Waste approach by: (1) identifying areas of major opportunity for improvement within the District through an evaluation of current successes and existing barriers to progress; (2) providing recommendations for improvement in these sectors based on existing Zero Waste models; and (3) providing recommendations for future actions to overcome existing barriers to progress.

What is Zero Waste and why should we work towards it?

In the past decade, numerous communities throughout the U.S. and the world have adopted Zero Waste as a guiding principle in solving waste management problems. Zero Waste employs a full-systems view that focuses on: 1) recapturing resources from the waste stream, 2) decreasing consumption, and 3) designing products more efficiently and for a full life-cycle.[1] In the words of the Zero Waste New Zealand Trust: "Zero Waste is both an end of pipe solution which encourages waste diversion through recycling and resource recovery, and a guiding design philosophy for eliminating waste at the source and at all points down the supply chain."[2] Working towards Zero Waste can help communities eliminate the environmental problems associated with resource extraction and waste disposal, conserve natural resources, strengthen companies and save them money through more thoughtful design, create jobs in waste management, and save on money previously used for waste disposal.[3, 4]

Summary and Evaluation of ACSWMD's Current Programs

Using five criteria—incentives and disincentives for waste production, infrastructure, community engagement, percentage contribution to total waste, and existing barriers—we analyzed the four major sectors of waste handled by the ACSWMD: 1) household hazardous waste, 2) organics, 3) construction and demolition debris (C&D), and 4) recyclables. On the basis of this evaluation, we believe that the areas that offer the greatest opportunity for improvement are organics and C&D. Additionally, we offer a strategic outreach plan aimed at engaging the community in waste disposal issues.

General Recommendations:

- Incorporate the Zero Waste philosophy into program planning and development
- Set a target goal for achieving Zero Waste

---

[1] Kinsella, Susan and Knapp, Daniel. "GRRN Green Paper #1 – Zero Waste: Management Principles for the Coming Age of Zero Waste." Grassroots Recycling Network. 27 September 2006. <http://www.grrn.org/zerowaste/grrn1.html>.

[2] Snow, Warren and Dickinson, Julie. "The End of Waste: Zero Waste by 2020." New Zealand Zero Waste Trust. 22 October 2006. <http://www.zerowaste.co.nz/assets/Reports/TheEndofWaste.pdf>. 5.

[3] Liss, Gary. "What is Zero Waste?" Grassroots Recycling Network. 27 September 2006. <http://www.grrn.org/zerowaste/articles/whaztiszw.html>.

[4] Central Vermont Solid Waste Management District (CVSWMD). "Solid Waste Implementation Plan (SWIP)." June 2003. 20 October 2006. <http://www.cvswmd.org/member_towns/solid_waste_plan.html>. Ch.3.

- Encourage greater involvement from community leaders from local government, businesses, non-profit organizations, and citizens groups

Organics

Recommendations

- Create and support partnerships between school/commercial kitchens and farms, commercial composting operations, or community compost piles to minimize transportation distances and reduce collection costs
- Provide incentives for commercial organics generators to improve source separation (e.g. plaques distributed to companies with successful composting programs, listing in a "Best Workplaces for Composting" guide)
- Establish social norms by allowing people to make responsible organics processing behavior public (e.g. "We Compost!" bumper stickers)
- Support policy changes at the state level (e.g. partner with advocacy groups like Toxics Action Center to encourage a statewide ban on organics from landfills)

Construction & Demolition

Recommendations

- Include C&D recovery plans in project design
- Include recovery requirement and goals in project specification and contracts
- Educate contractors and crews on materials recovery techniques
- Hold subcontractors accountable
- Provide incentives (e.g. tax deductions, market value of salvaged material)

Outreach Plans and Goals

A questionnaire has been designed to help the District gather information on awareness, behavior and barriers to participation in ACSWMD programs. The questionnaire will be distributed in the winter 2007 newsletter from the ACSWMD. It is recommended that the Survey Monkey web service (www.surveymonkey.com) be used to create an internet link to the survey to minimize paper waste. The questionnaire is structured to: (1) assess the level of awareness of the facilities and programs offered by the ACSWMD, (2) understand personal diversion habits of county residents, (3) illuminate the obstacles experienced by individuals during the process of separating their waste, and (4) understand the motivations for those who do responsibly process their waste. The second component of our outreach efforts involved a survey of local restaurants to determine their receptiveness and interest in participating in a composting program.

Conclusion

We believe that the power of ACSWMD lies in its ability to recapture resources. Consumption patterns and manufacturer liability need to be dealt with on a broader scale. Consequently, true progress towards Zero Waste requires a combination of "bottom-up" and "top-down" approaches in which individuals are educated about the systems in place to help consumers divert and process their waste, the importance of responsible waste disposal, and the exposure to the power that they wield as consumers. When this consumer action is supported by policy changes and incentives, transitioning to Zero Waste is made possible.

> "Most of us know in our hearts that there's far more to life than the next sale at the mall. We long for deeper connections with our families, our neighbors, and our natural environment….We work long hours to bequeath to our children and grandchildren the kinds of home-grown economies that keep delivering prosperity. Why just wonder about what's possible in your backyard? Why just dream about a past long gone, or a future far away? Why not get started *today?*"
>
> -Michael Shuman in *Going Local* (202-203)

> "A natural system that's working in balance doesn't produce 'waste.' One material feeds another; life, death, decay to new life is the natural cycle…We can implement the same process in our communities."
>
> - CVSWMD "Introduction to Zero Waste"

1. INTRODUCTION

1.1 Zero Waste in the Context of "Healthy Local Communities"

This report represents the culmination of a semester-long research project conducted by undergraduate students enrolled in the Environmental Studies 400-level senior seminar offered at Middlebury College in the fall semester of 2006. The seminar focused on the theme of "healthy local communities" and the potential they offer in dealing with many of the larger scale environmental problems that challenge the modern world. As Michael Shuman explains in *Going Local*, in a general sense, action at the local level offers many advantages over action at the higher levels of the state or nation. Local action "peels away unnecessary layers of bureaucracy," bridging the disconnect between decision-makers and stakeholders, facilitating both more progress and progress better suited to the particular needs of the community, and "unleash[ing] American ingenuity" through greater ability for experimentation.[5] Additionally, communities also offer the ideal scale at which to work towards sustainability and self-reliance.

These two terms—sustainability and self-reliance—may be viewed simply as catch-phrases used by environmentalists; however, in actuality, they convey ideas crucial to both the environmental and economic viability of communities. Hazel Henderson defines sustainability as "providing equitably for the needs of the present generation without jeopardizing the needs of future generations."[6] This definition implicitly conveys a need to protect or conserve resources, while more explicitly expressing the necessity to ensure the productivity and survival of one's descendants. It is most effectively achieved at the small-scale, where local materials and energy can be handled efficiently and appropriately. In the words of William McDonough and Michael Braungart, "…all sustainability…is local."[7] Self-reliance is equally important to the environmental and economic health of a local community—"a good community…depends upon itself for many of its essential needs and is thus shaped, so to speak, from the inside."[8] Thus, the community level is both a fertile and appropriate level at which to achieve environmental and economic progress, on both the small and large scale.

---

[5] Shuman, Michael H. *Going Local*. New York: The Free Press, 1998, 126-127.

One significant element of any "healthy local community" is the movement and treatment of materials within the community. As McDonough and Braungart explain, "The vitality of ecosystems depends on relationships: what goes on between species, their uses and exchanges of materials and energy in a given place."[9] Similarly, the vitality of human communities—their sustainability and self-reliance—depends largely on the way these resources are used and disposed.

In 2002, the Central Vermont Solid Waste Management District (CVSWMD) began to recognize the unhealthiness of resource use and waste disposal practices within its own communities. The CVSWMD found that over the one year period spanning 1999 to 2000, its member municipalities, home to a combined population of approximately 60,000, sent about

---

[6] Henderson, Hazel. "Development Beyond Economism: Local Paths to Sustainable Development." In *People, Land, and Community: collected E.F. Schumacher Society Lectures*. New Haven: Yale University Press, 1997, 2-3.

[7] McDonough, William and Braungart, Michael. *Cradle to Cradle: Remaking the Way Things Work*. New York: North Point Press, 2002, 123.

[8] Berry, Wendell. "The Work of Local Culture." 1988. 12 September 2006. <http://www.schumachersociety.org/publications/essay_work_local.html>. 5.

[9] McDonough and Braungart, 121.

38,000 tons of garbage to landfills—an average of 3.5 lbs per person per day. In pure financial terms, the District determined that waste disposal cost between $2,347,000 and $3,080,000 per year. This financial burden weighed upon communities in which the average annual wage was $30,000 and the average annual town budget was approximately $1.5 million—communities in which $2-3 million was no small sum.[10]

However, financial consequences were not the only unsavory effect of waste habits in the District. They also led to resource depletion through the loss of once valuable raw materials to landfills, habitat destruction and diminishment of biodiversity due to both landfillinging and the harvesting of new raw materials, environmental pollution from landfills and garbage trucks, and several associated negative human health effects. Together, these negative side-effects revealed the true consequences of the resource consumption and waste generation habits within the District. The CVSWMD encapsulated the situation well: "While we count our pennies in order to improve the quality of our lives, each time we throw an item in the trash, we are undermining our financial well-being as well as threatening our ability to continue to live the lives we have."[11] The negative effects of poor resource use and waste disposal practices by municipalities within the CVWSMD stand as a powerful testament to the importance of these elements to the health and viability of all communities.

At the same time, the response of the CVSWMD to the discovery of its problems offers a positive example for other communities or groups of communities in similar positions. Prior to 2002, the District had focused its efforts on reactionary approaches to waste; however, following increased understanding of the true state of its communities, it chose a different, more productive and enduring tactic—Zero Waste. This approach involved deviating from basic "waste management," towards a new perspective involving both waste prevention and resource management.[12] McDonough and Braungart explain that "natural systems take something from their environment, but they also given something back."[13] Zero Waste attempts to do the same with human systems.[14] This approach provided the CVSWMD with the ability to work towards ending practices which they felt were "at odds with the health and well being of [their] communities"[15] and to foster healthier, more sustainable and self-reliant practices.

---

[10] CVSWMD. "SWIP." 1 May 2003. < http://www.cvswmd.org/member_towns/solid_waste_plan.html>. Ch.3.
[11] Ibid.

We believe that the Zero Waste approach offers great potential for working towards more local, sustainable solutions in resource and waste management at the community level. We recognize the Addison County Solid Waste Management District (ACSWMD), also of Vermont, as another district in which significant opportunity for progress towards Zero Waste exists. The objective of this report is to assist the ACSWMD in transitioning towards a Zero Waste approach by: (1) identifying areas of major opportunity for improvement within the District through an evaluation of current successes and existing barriers to progress; (2) providing recommendations for improvement in these sectors based on existing Zero Waste models; and (3) providing recommendations for future actions to overcome existing barriers to progress. Ultimately, we hope that this study will help the communities within the ACSWMD achieve a greater level of health and viability. According to Wendell Berry: "The possibility of change depends upon the existence of people who have the power to change."[16] The CVWSMD has shown its ability to change by working towards "the transition from…being part of the United States' wasteful society to…establishing [their] region as a sustainable community that values and preserves its resources.[17] We believe the ACSWMD can do the same, and possibly more.

---

[12] Ibid., Ch.1.
[13] McDonough and Braungart, 155.
[14] Kinsella and Knapp.
[15] CVSWMD. "SWIP." Ch.1
[16] Berry, 12.

1.2 What is Zero Waste and Why Should We Work Towards It?

Before conducting an evaluation of ACSWMD programs on the basis of Zero Waste ideals, it is first necessary to define Zero Waste and explain its value as a tool in working towards healthier local communities. In the past decade, numerous communities throughout the U.S. and the world have adopted Zero Waste as a guiding principle in solving waste management problems. These communities include, most notably: several counties of California, the city of Seattle, WA, multiple cities and districts of British Columbia, Canada, 48 of 74 local authorities in New Zealand, and other examples in England and Australia (*Appendix A*).[18] The popularity and growth of this approach is a testament to its novel outlook on waste management. While the term "Zero Waste" itself may suggest a focus solely on waste, it actually employs a full-systems view of human resource and consumption cycles.[19] In the words of the Zero Waste New Zealand Trust: "Zero Waste is both an end of pipe solution which encourages waste diversion through recycling and resource recovery, and a guiding design philosophy for eliminating waste at [the] source and at all points down the supply chain."[20]

The ultimate goal of Zero Waste is to reach 100% diversion of materials from the waste stream – to "eliminate rather than 'manage' waste."[21] To do this, Zero Waste adopts an outlook modeled on the flow of resources in nature. As the CVSWMD explains: "A natural system that's working in balance doesn't produce 'waste;'"[22] rather, in nature, waste to one organism is simply a resource to another.[23] The Zero Waste approach attempts to minimize waste in human systems in a similar way—by recapturing resources from discarded goods to use as raw materials. In addition, it works to reduce consumption, as well as to encourage better design of products. Manufacturers should work towards high-levels of efficiency to minimize the waste created during production and should also design goods such that they can eventually be broken down and used as raw materials in new products.[24, 25] Zero Waste thus encompasses both waste reduction and resource conservation.

---

[17] CVSWMD. "SWIP." Ch.3.

[18] Central Vermont Solid Waste Management District (CVSWMD). "Intro to Zero Waste." October 2003. 27 September 2006. <http://www.cvswmd.org/pdf/ZWfactsheet.pdf>.

[19] Kinsella and Knapp.

[20] Snow and Dickinson. "The End of Waste: Zero Waste by 2020." 5.

[21] Ibid.

[22] CVSWMD. "Intro to Zero Waste."

Ultimately, successful improvement in these three major areas – waste management, consumption, and production – can move a community towards the goal of Zero Waste. While 100% diversion may in fact seem unrealistic, setting such a high goal is nonetheless significant. As the CVSWMD explains: "Where we aim is the first step; the goals we establish shape our actions."[26] Even without achieving total diversion, working towards Zero Waste can help communities reduce both the pressure on existing landfills and the conflicts associated with siting new ones, minimize the environmental problems associated with resource extraction and waste disposal (at landfills and incinerators), and conserve natural resources. It can also boost the local economy by strengthening companies and saving them money through more thoughtful design, creating jobs in waste management, and saving money used for waste disposal.[27, 28] Eric Lombardi explains more concisely: "A Zero Waste Strategy speaks to all environmental protection interests—air, water, soil, species, etc.—and can help create new positive alternatives to how we use our dwindling natural resources."[29] Regardless of the explanation, from all perspectives, Zero Waste offers communities an opportunity for a healthier, more sustainable, and more prosperous future.

---

[23] Kinsella and Knapp.
[24] Snow and Dickinson. "The End of Waste: Zero Waste by 2020." 5.
[25] Kinsella and Knapp.
[26] CVSWMD. "Intro to Zero Waste."
[27] Liss.
[28] CVSWMD. "SWIP." Ch.3.

---

[29] Lombardi, Eric. "Beyond Recycling! Zero Waste…or Darn Near." Grassroots Recycling Network. 31 October 2006. <http://www.grrn.org/zerowaste/articles/biocycle_zw_commentary.html>.

2. SUMMARY AND EVALUATION OF CURRENT ACSWMD PROGRAMS

2.1 Summary

Background

As stated earlier, we recognize significant potential for progress towards Zero Waste in the Addison County Solid Waste Management District (ACSWMD). Before assessing that potential, however, it is important to provide a brief background on the District, its missions, its organizational structure, and the powers it possesses.

The ACSWMD, originally formed in 1988 by 18 towns and cities within Addison County, currently has 19 member municipalities (*Appendix B*). During the 2000 U.S. Census, the total population within the District was 30,411, including 10,894 year-round households and 1,399 seasonal households.[30] The most recent data (2001) also show the District to be home to approximately 1,084 businesses.[31] The Solid Waste Implementation Plan (SWIP) of the ACSWMD explains its basic purpose: "The District exists to cooperatively and comprehensively address the solid waste management interests of its member municipalities."[32]

The governing body of the District is a Board of Supervisors. Each member municipality appoints one representative to the Board for a one-year term, and the voting power of each representative is proportional to the population of his or her town or city.[33] Member towns may vote to withdraw from the District at any point (pending no outstanding financial obligations); alternatively, new members may apply to join the District, but can only do so following approval of the Board.[34] The major powers of the ACSWMD include the ability to "own and operate solid waste facilities, or to contract for the provision of solid waste services" and the ability to adopt ordinances, which "establish the day-to-day details of implementation systems and provide enforcement mechanisms."[35] These two powers provide the major venues through which the District may conduct, delineate, and enforce its waste management plan.

---

[30] Addison County Solid Waste Management District (ACSWMD). "Solid Waste Implementation Plan (SWIP)." June 2006. 22 September 2006. <http://www.acswmd.org/Final.SWIP.Master.Document.7.25.06.doc>. 2.

[31] Ibid., 14.

[32] Ibid.

[33] Ibid., 2.

[34] Ibid., 4.

The SWIP explains that the missions of the District are to:

1. "Promote waste reduction and pollution prevention;
2. Maximize diversion of wastes through reuse, recycling, and composting;
3. Provide for the disposal of remaining wastes; and
4. Seek environmentally sound and cost-effective solutions in all of its programs, services, and facilities."

In order to achieve these goals, the District, which is a non-profit government entity, must finance its programs. It does so through charges such as tipping fees, donations or fees at district-sponsored events, and state and federal grants. The ACSWMD also has the power to levy assessments on member municipalities; however, it has never employed this means of financing.[36]

This demographic, organizational, and economic background of the ACSWMD provides the context in which the District carries out all of its current programs. Therefore, we have attempted to make all evaluations and recommendations in this report in recognition of, and in respect to, this context.

Successes

- **Licensed waste haulers.** The ACSWMD's Waste Management Ordinance establishes a licensing program for haulers that allows the District to place conditions on the haulers including reporting, weighing requirements, and per ton fee payments. In addition, the District requires licensed haulers to provide recycling services and adopt a tiered fee schedule to create a financial incentive for customers to generate less waste. Therefore, although the District does not have direct control over the solid waste and recyclables waste stream, it can create regulations through its licensing agreement with the haulers.[37]

---

[35] Ibid., 3-4.
[36] Ibid., 5.

- **Mandatory recycling.** The District has had a mandatory recycling ordinance in effect since 1993. The District's Waste Management Ordinance requires that recyclables be separated from waste and residents and waste haulers must adhere to these guidelines or face fines.[38]
- **Tiered billing schedules.** The District's Waste Management Ordinance requires that haulers use a tiered billing schedule so that there is a financial incentive for the individual to reduce the amount of waste they generate.[39]
- **Curbside collection.** All District residents have access to curbside pick-up by private haulers and 16 towns have drop off centers also operated by the private sector.[40] This is an important service and one that should be continued.
- **Distribution of blue bins.** The ACSWMD purchases approximately 450 blue recycling bins annually for distribution to residents and businesses. The District offers the first bin free to all residents and additional bins are available at a nominal cost. Schools that participate in education programming can receive blue bins for free.[41]

---

[37] Ibid., 7.
[38] Ibid., 8.
[39] Ibid.
[40] Ibid., 21.
[41] Ibid., 20.

- **Household hazardous waste recovery.** The District has an excellent diversion record for special and universal wastes and has developed infrastructure to support handling of these materials.[42]
- **Education and outreach.** The District promotes its programs and services, and encourages waste reduction and recycling, through its newsletter, "News to Reuse." Educational programming and technical assistance through the Association of Vermont Recyclers occurs within local schools.[43]
- **Identification of gaps in diversion.** The District identified C&D, organics, commercial organics and residential recycling access in their SWIP as gaps in their diversion efforts and has focused efforts on improving diversion in these categories.[44]

Barriers

- **Financial limitations and source of funding.** Though the ACSWMD, a public entity, has made adequate revenue to exceed its operating costs in recent years,[45] it is still limited in its ability to implement new programs or augment existing ones by monetary constraints. For example, though the District has determined that the most effective way to increase recycling by businesses would be to provide free recycling bins, "Bin distribution is a major undertaking and has not been pursued to date because of cost."[46] Simple measures are thus often sacrificed as a result of financial limitations. Furthermore, because the major source of funding for the subsidization of diversion efforts comes from tipping fees proportional to the amount of waste brought in by haulers, as diversion rates increase in the future, funding will decrease. This poses a major barrier to continued improvement in diversion in the future.[47]

---

[42] Ibid., 18.
[43] Ibid., 19.
[44] Ibid., 21.
[45] Personal communication, Teresa Kuczynski, 2006.
[46] ACWSMD. "SWIP." 15.

- **Consumer and business cooperation/participation.** The cooperation and participation of consumers and businesses in the District in diversion programs have a major effect on the success of these efforts. Recycling serves as an illustrative example because it has been a well-established and popular part of waste management in the ACSWMD since 1993.[48] For businesses, recycling is mandatory; however, as of 2001, only 59% of businesses in the District had a recycling program.[49] The District has done well to identify some of the causes behind this figure as well as potential options for improvement; however, participation and cooperation is ultimately determined by the businesses themselves. Residential recycling programs in the District also show significant obstacles. Recycling is not controlled centrally by the ACSWMD, but is left to individual towns. As a result, factors like the location of recycling centers and whether single-stream recycling (i.e. unsorted recycling) is employed have a significant impact on per capita recycling by residents.[50] The individual recycling habits of consumers, like businesses, thus pose a significant barrier to increased diversion. Other sectors of the waste stream—such as organics—likely have similar characteristics.
- **Long-term contracts.** Because it contracts out hauling of solid waste to private, licensed companies,[51] the ACSWMD is held to the conditions of these contracts for their entire duration. As a result, these contracts inhibit the ability of the District to change its

---

[47] Ibid., 28.
[48] Ibid., 24.
[49] Ibid., 14.
[50] Ibid., 12.
[51] Ibid., 5.

policies—for example, the conditions of its Waste Management Ordinance.[52] Other contracts outside of hauling also restrict changes in policy by the ACSWMD. For example, due to the original host town agreement of the ACSWMD with the town of Middlebury, the District cannot accept recyclables at its transfer station, eliminating a potential convenient and centralized location for recycle drop-off.[53]

- **Flow control.** Flow control is the legal authority of government at the state or local level to determine or limit where municipal solid waste can be taken once it has been picked up by a hauler.[54] This power essentially gives the ACSWMD the ability to dictate what practices are used to treat, process, or dispose of the solid waste originating in its member municipalities; thus, it is crucial to any movement towards Zero Waste at the district level. However, a recent ruling by the Vermont Supreme Court has determined Flow Control to be unlawful, stripping the District of this important authority. The topic is likely to be revisited by the Supreme Court in January and June of 2007.[55]
- **Role as a waste management facility.** Because it is ultimately an entity created for waste management, the ACSWMD does not have significant power to affect consumer and producer behavior. As explained earlier, Zero Waste requires changes in: (1) waste management practices; (2) consumption habits; and (3) product design and manufacture. The ACSWMD has very little control over the latter two components; as a result, it is limited in its ability to single-handedly work towards Zero Waste.
- **Ideological Commitment.** The ACSWMD is further limited by its ideology. As of the completion of this report, the District has made no overall commitment to the full-

---

[52] Ibid., 8-9.

[53] Ibid., 26.

[54] US EPA. "Flow Control and Municipal Solid Waste Executive Summary." September 1992. 8 December 2006. <http://www.epa.gov/epaoswer/non-hw/muncpl/flowctrl/report/execsum.pdf>. 1.

[55] Personal communication, Teresa Kuczynski.

systems approach of Zero Waste. Currently, the District continues to work towards the statewide goal of 50% diversion, which is an admirable goal. However, a true effort towards Zero Waste must begin with an ideological commitment;[56] until the ACSWMD takes this step, it will be limited by its own mindset.

Recommendations

- **Incorporate the Zero Waste philosophy into program planning and development.** The Zero Waste philosophy is based on the belief that "waste" should be replaced with the term "resource." Waste and especially organic waste must be seen as resources, that when lost to the landfill, represent a true loss of material potential as a source of food, fertilizer, or fuel. District correspondence and promotional materials (i.e., SWIP, Annual Report, "News to Reuse", website information, etc.) should be written with language that reflects this ideological shift in thinking.
- **Encourage greater involvement from community leaders** from local government, businesses, non-profit organizations, and citizens groups. Zero Waste depends on support from people at all levels within the community. Utilize the influence and energy of local leaders to spread the Zero Waste message.
- **Set a target goal** for achieving Zero Waste (many communities allow 15 or 20 years). This report recommends steps that will move the District towards a greater diversion rate. However, placing these steps under a Zero Waste framework is important because it means that efforts do not stop when the state-wide goal of a 50% diversion rate is achieved and incorporates a long-term outlook into program development. Most communities find it helpful to attach a realistic time frame to an idealistic goal to drive

---

[56] Snow, Warren and Dickinson, Julie. "GETTING THERE! The Road to Zero Waste: Strategies for Sustainable Communities." Zero Waste New Zealand Trust. 22 October 2006. <http://www.zerowaste.co.nz/assets/Reports/roadtozerowaste150dpi.pdf >. 34-35.

progress forward while allowing time to make the necessary operational and philosophical transitions.

- **Monitor success of single-stream recycling** compared to multiple stream systems. The advantages and disadvantages between different collection systems have been widely debated. Some experts recommend three container curbside systems in which recyclables and organics are isolated from remaining residuals. In 2002, a substantial number of towns within the District indicated that they would transition to single stream recycling with the hope of increasing recycling participation and set-out rates and reducing collection costs for haulers. While making recycling more convenient for residents and haulers is important, single-stream recycling often lowers the quality of the recycled feedstock. [57]

2.2 Evaluation

Movement towards a goal of Zero Waste is a comprehensive process that involves several different components. In 2003, the Zero Waste New Zealand Trust published "The Road to Zero Waste: Strategies for Sustainable Communities" which offered seven key strategies for any community seeking to work towards Zero Waste. These strategies include: (1) adopt a Zero Waste target; (2) plan for success; (3) put the incentives in the right place; (4) develop infrastructure for recycling and resource recovery; (5) engage (and inspire) the community; (6) walk the talk; and (7) lobby for new rules (*Appendix C*).[58] In the context of the ACSWMD, a waste-management district which has not yet made an ideological commitment to Zero Waste, some of these strategies seem more practical than others. In particular, developing effective incentives and disincentives, building appropriate infrastructure, and engaging the community offer immediate pathways to increased waste diversion and resource recovery. Examining the status of the major sectors of the ACSWMD—household hazardous waste, organics, construction and demolition debris (C&D), and recycling—provides a basis for assessing the sectors in which the greatest opportunity for progress towards Zero Waste exists. Additional factors which provide insight into the potential for improvement include percentage of each sector's contribution to the District's total waste stream and existing barriers to progress.

---

[57] ACSWMD. "SWIP." 16.

[58] Snow and Dickinson. "GETTING THERE! The Road to Zero Waste: Strategies for Sustainable Communities." 34-35.

Using these five criteria—incentives and disincentives for waste production, infrastructure, community engagement, percentage contribution to total waste, and existing barriers—we analyzed the four major sectors of waste handled by the ACSWMD. Table 1 (see below) offers a summary of our evaluation of the potential for progress in each of the four sectors. On the basis of this evaluation, we believe that the areas that offer the greatest opportunity for improvement are organics and C&D. The District's household hazardous waste program is currently above satisfactory in a number of areas and, thus, offers the smallest opportunity for progress. Similarly, although the recycling program as currently structured offers major areas for improvement, the existence of a major barrier—the inability of the ACSWMD to offer a central drop-off location due to its host agreement with the town of Middlebury—leaves little opportunity for progress in the immediate future. Thus, in the following sections of this report, we focus on providing recommendations for progress towards Zero Waste in the areas of organics and C&D. Additionally, we offer a strategic outreach plan aimed at fostering wider community participation in both of these areas.

A primary step is to continue to fill in major gaps in diversion and expand upon other significant areas of opportunity for improvement. The majority of this report will work towards that end; however, we will finish by taking a step back and offering broader-picture suggestions—based largely on the CVSWMD and other model Zero Waste communities—to help the District overcome barriers to progress and work towards a more comprehensive Zero Waste approach.

	Incentives/ Disincentives	**Barriers**	**Pure Tonnage**	**Effective Infrastructure**	**Community Engagement**
Household Hazardous Waste	Many categories of waste can be disposed of at the transfer station for a nominal fee or free of charge	It is inconvenient to bring the waste to the transfer station	80 tons (2002)	They accept a very comprehensive list of hazardous waste items	Participation - 8.9% in 2001 (up from 0.8 in the first year)
	It is illegal for businesses and institutions to throw hazardous waste in the trash	Limited hours of acceptance		Temporary holding facility	Well publicized with their newsletter, in local newsletters, event posters, advertising at recycling centers, advertising on cable television and on radio, among other methods
	Properly disposing of hazardous waste decreases the amount of trash that you are paying to dispose of			Swap shop - embodiment of a zero waste program	
ranking: ****					
Construction and Demolition	Tax deduction	Cost of collecting, sorting, and processing	4459 tons (2001)	Reuse center - embodiment of a zero waste program	They currently don't recycle C&D, so none
	2007 Proposed C7D Reuse center (free disposal and low-cost trucking)	The low value of the recycled content material in relation to the cost of virgin material		Promotion of the Vermont Business Materials Exchange	
ranking: **	Imposition of fines on contractors who violate their disposal policies				
Composting	Free disposal	Rural character of the district makes operation of a central facility difficult	33 tons have been diverted through individual home composting	Separate trucks needed for collecting compost	Many education efforts, through their newsletters
	Free compost	Hygiene and Smell	11 tons have been diverted through the supermarket program	They have no centralized facility	Subsidize the cost of composters
	Spend less on waste disposal fee	Contamination		Subsidize the cost of home composters	State Master Composer certification program
ranking: ** $^{1/2}$		Residential and commercial space constraints			
Recycling	Reduce waste quantity and lower the cost of waste disposal	Inconvenient to clean and separate the items out from the rest of the trash	5033 tons (includes business & residential curbside collection, and recycling centers)	The district cannot accept recyclables because of an agreement with the town of Middlebury	Education and Outreach to the communities and local schools
	Returnable bottle deposits	Space for another bin to hold the recyclables		Decentralized and expensive (recycling centers)	
ranking: ****					

Table 1: Ranking of ACSWMD's current waste management practices (ranking is out of 5 stars)

3. ACSWMD GAPS IN DIVERSION: ORGANICS AND CONSTRUCTION & DEMOLITION

The state of Vermont had set a 50% diversion goal to be reached by 2005. In order to meet the state's target rate, the ACSWMD still needs to achieve at the very least an additional 16% diversion of tonnage. While the ACSWMD should consider redesigning their programs to reflect the Zero Waste philosophy, a 50% diversion rate presents a reasonable target for moving towards this long-term goal. The ACSWMD managers identified several key areas of the waste stream that may help them reach this goal most efficiently. The main gaps in diversion efforts include construction and demolition debris, organics, commercial organics, and residential recycling access.[59] While the State of Vermont does not allow the inclusion of construction and demolition debris in the calculation of the official diversion rate, we believe it still represents an important area for improvement. Our group decided to focus our efforts on analyzing the current practices and identifying strategies to improve diversion rates of residential and commercial organics and construction and demolition debris to begin to move the ACSWMD towards a Zero Waste model.

3.1 Organics

Background

Composting organic material is one of the most important steps that a community can take to increase their diversion rate and move towards a Zero Waste goal. In 1998, organics made up 68.8% of the national waste stream. Newspaper, office paper, paperboard, and corrugated cardboard make up a majority of the organics stream, but generally have high recovery rates.[60] However, yard trimmings, food, and wood scraps still constitute a substantial fraction of the overall residual waste stream, and therefore represent an area of great potential for significantly increasing diversion rates and capturing lost resources.[61]

---

[59] ACSWMD. "SWIP." 21.

The diversion of organics from the waste stream can have substantial economic, environmental, and human health advantages. Composting the 62 million tons of organic wastes produced in the United States each year instead of disposing them in conventional ways results in average national savings ranging from $9 to $37 per ton. The separation of yard trimmings alone can divert nearly half a ton per household each year from the waste stream, resulting in avoided collection costs averaging $23 per ton.[62] Organics that enter the landfill can have serious environmental and human health implications. Organic material left to rot in landfills generates methane gas (a contributor to the rise in global temperatures), produces organic acids that release metals into surface and ground water, and releases offensive odors into the surrounding area.[63] When diverted from the waste stream, organic materials provide a rich source of nutrients that can be applied to lawns, gardens, and fields to replace toxic soil amendments and actually improve the quality of soil for agriculture and landscaping.[64]

Efforts to reduce the amount of organic wastes entering the landfills can take many forms and, depending on the strategies used, may require the participation of a variety of stakeholders including individuals, business owners, haulers, waste managers, and policy makers. Composting of organic wastes can be done on any scale, from individuals composting their kitchen scraps on a household by household basis to the construction of a centralized facility managed at the municipal level. However, each of these strategies incurs costs, and the primary goal for each community is to find the strategy that both minimizes costs and maximizes the participation rate and the quality of organic material entering the system. A cost comparison of different management strategies for processing organic material is included in *Appendix D*. In general, as the number of stakeholders increases, the cost of processing organics increases.[65]

---

[60] US EPA. "Organic Materials Management Strategies." 1999. 23 October 2006. <http://www.epa.gov/epaoswer/non-hw/compost/omms.pdf>. 1.

[61] US EPA. "Value of Recovered Organic Materials." 2000. 28 October 2006. <www.epa.gov>. 3.

[62] US EPA. "Organic Materials Management Strategies." 10.

[63] Connett, P. and Sheehan, B. "A Citizen's Agenda for Zero Waste: A United States/Canadian Perspective." GrassRoots Recycling Network. 2001. 28 October 2006. <http://www.grrn.org/zerowaste/community/activist/citizens_agenda_4_zw.html>. 11.

[64] CVSWMD. "SWIP." Ch.6.

On one end of the scale are large-scale composting programs where residential and commercial wastes are collected and brought to a centralized facility for processing. Centralized composting facilities are often an effective way to manage large amounts of organic wastes in urban settings where high densities of generators maximize collection efficiency. Collection costs increase as programs expand from the downtown service area to urban neighborhoods and suburban cities.[66] These materials are picked up using curbside collection or brought directly to centralized drop-off locations by generators. In Seattle, Washington, residents can subscribe to a collection service that picks up compostables from commercial and residential generators and transports them to Cedar Grove's large-scale commercial composting facility.[67] A composting facility designed to process yard trimmings and other organic materials can be simple in design and many consist only of static piles or long windrows that are turned regularly to maintain aerobic conditions.[68] However, large-scale facilities require adequate land to support the necessary infrastructure and can have high operational costs.[69]

---

[65] Connett and Sheehan, 12.

[66] US EPA. "Organic Materials Management Strategies." 10.

[67] Cedar Grove Composting. "Cedar Grove Organics Recycling." 2003. 29 November 2006. <http://www.cedar-grove.com/organics/default.htm>.

[68] Connett and Sheehan, 12.

[69] US EPA. "Organic Materials Management Strategies." 10.

A preferred method is to encourage homeowners to find ways to process their yard wastes at home. It is inefficient and uneconomical for municipalities to have to collect and handle these materials when they can be effectively processed where they are produced. Furthermore, there are clear advantages for individuals and institutions to retain these resources on their property. Organic mulches consisting of leaves, wood chips, and grass clippings can be applied to planting beds to retain soil moisture, reduce weed growth, moderate daily and seasonal temperatures, and reduce soil erosion. Compost trenches can be created in flower beds or gardens to bury and compost pulled weeds and garden or kitchen wastes. Grasscycling, using a mulching mower to leave grass clippings on the lawn to decompose, can save time and money and reduce or eliminate the need for fertilizer applications.[70] For larger quantities of yard and kitchen wastes, a compost pile or bin can be used to speed up the natural process of decomposition.[71] Many municipalities subsidize backyard composting kits and sponsor Master Composters' programs to provide individuals with the infrastructure and technical know-how to begin composting at home. Programs at the community level include community composting plots or community gardens.[72]

Many of the programs outlined above require incentives be put in place to encourage individual or institutional commitment to Zero Waste philosophies. Policies enacted at the state or district level can provide an effective means for mandating that individuals, businesses, and institutions adopt innovative management alternatives to divert organic materials from the waste stream. In 1993, public officials in Wisconsin, after realizing that almost a fifth of the landfill capacity in some areas of the state was filled with organic materials, decided to ban yard wastes completely from landfills, forcing municipalities and citizens to rethink how they processed these materials.[73] In 1995, Nova Scotia released a Solid Waste-Resource Management Strategy that included a 1998 ban on land filling and incineration of all organic materials. Primarily as a result of this policy, Nova Scotia's diversion rate increased to 44% by 1999 and further improvement was expected as more composting facilities opened up in the future.[74] The ban forced source separation at the residential, institutional, and commercial levels and encouraged the creation of screening facilities at the landfill.[75]

---

[70] US EPA. "Recovering Organic Wastes—Giving Back To Mother Nature". 1999. 28 October 2006. <www.epa.gov/wastewise>. 2.

[71] University of Wisconsin-Extension. "Managing Leaves & Yard Trimmings". 1999. 28 October 2006. <http://clean-water.uwex.edu/pubs/pdf/home.managlt.pdf>. 9.

[72] Connett and Sheehan, 12.

Nova Scotia serves as a useful model for understanding how local municipalities can adapt to a state mandate to eliminate organic material from the waste stream. The response of municipalities has varied widely. Some districts have opted to send their organic material to private facilities or entered into agreements with local farms while others have plans to create full-scale centralized composting facilities. Municipalities promote backyard composting but curbside collection of organics is available to 70% of residents. While the original plan was to provide every citizen with access to curbside collection, municipalities located in rural areas have approached curbside pick-up of organic wastes with more hesitancy because of the greater operational costs required. As a result, exceptions have been made for some jurisdictions as long as they meet certain requirements: (1) have extensive backyard composting programs in place, (2) monitor the progress of backyard composting, (3) accept leaf and yard trimmings, and (4) enforce complete source separation of organic materials. The development of composting infrastructure has been largely successful although many composting facilities are still in the planning stages or are in the process of being built.[76]

---

[73] "Managing Leaves and Yard Trimmings." 1.

[74] Friesen, B. 2000. "Landfill Ban Stimulates Composting Programs in Nova Scotia. Biocycle Magazine." 2000. 6 November 2006. <http://www.jgpress.com/BCArticles/2000/030053.html>.

[75] Connett and Sheehan, 11.

Designing a comprehensive organics processing program in a small, rural district can be challenging. The Central Vermont Solid Waste Management District's Zero Waste philosophy identified the diversion of organic matter as the single most important program in its activities over the 5 year period between 2003 and 2008. However, their approach to organics processing has been to target the large scale organic producers. To this end, CVSWMD first reviewed its surcharge ordinance, hauler requirements, and other regulations to ensure that there were enough financial incentives in place for generators to divert organic matter to non-waste uses. They decided to focus outreach and education initiatives on large generators simply because they represented the areas of greatest potential while targeting residents only as financial resources allow or when the opportunity to reach a large group of people at one time arise (e.g., passive compost demonstration gardens, incentives for curbside collection of organic material, pilot programs for food waste diversion). The CVSWMD chose to target educational programming at schools because they recognized this forum as an area where there is a great opportunity for encouraging behavioral change at a young age. They also encouraged and initiated partnerships between organic generators and users by connecting local, commercial food waste generators with small farms in the area. For example, in 2002 the City of Montpelier created a partnership with two large scale users of clean leaf waste—FoodWorks' Two Rivers Organic Farm and Vermont Compost.[77]

---

[76] Friesen.

[77] CVSWMD. "SWIP." Ch.6.

Residential and Commercial Food Waste

Since 1992, the District has subsidized home compost bins for interested ACSWMD residents. Over 100 compost bins have been sold each year since 1996 and it is estimated that 33 tons of organic wastes have been diverted from the waste stream by residential composting efforts. Residential organics can be brought to the Transfer Station for those who cannot participate in home composting, although this service is rarely used. The ACSWMD promotes residential food waste diversion through a variety of ways by distributing brochures on various composting techniques at several events throughout the year, providing technical advice to interested residents, advertising the Master Composter program offered by the state, promoting home composting through its seasonal newsletter, and is in the process of developing a home composting demonstration area at the Transfer Station.[78]

Restaurants and grocery stores within the ACSWMD produce between 250 and 300 tons of food waste per year and represent approximately 1.7% of the total annual waste stream. The ACSWMD has identified this sector in their programming and created a pilot commercial waste-composting program that lasted from 1999-2001. This program was discontinued because of the operational, logistical, and financial challenges it created for administrators. Since then, the ACSWMD has relied on the private sector to fill in this service gap. A new pilot program, funded with help from the Vermont Agency of Natural Resources, was initiated in August 2006 to collect organic wastes from the two major grocery stores in town with the waste being transported by Casella Waste Systems, Inc. to Vermont Natural Ag Products. More than 11 tons of food waste have been diverted since the inception of this program and at least two more grocery stores are planning to participate in the program.[79] There is a great deal of potential for expanding this program to include local restaurants and schools.

---

[78] Ibid., 20.

Controlling the contamination levels of the food wastes has proved to be a major challenge despite efforts by the ACSWMD to educate employees. Due to the relatively low volumes of organics produced and the geographic dispersion of generators, the collection of commercial organic waste is very expensive. The ACSWMD has chosen to promote on-site or on-farm composting and was looking to host an organics summit to coordinate the efforts of generators, haulers, farmers, and other composting operations to create a network of interested parties.[80]

Yardwaste

Currently, the ACSWMD accepts brush and branches under 6-inches in diameter. These materials are processed and mulch is provided free of charge to interested residents and businesses. The ACSWMD also chips Christmas trees and distributes mulch as part of an annual "Merry Mulch" program.[81] In 2001, the ACSWMD diverted 53 tons of raw wood.

Previously, the ACSWMD did not accept leaves, grass clippings, other small, non-woody yard wastes, stumps, large trusses, or timbers. The onus was largely up to individuals and commercial organizations to dispose of any yard waste they generated. Results from a 2002 Customer Satisfaction Survey indicated that a majority (68%) of ACSWMD residents did compost their yard wastes. At least four stump dumps, including one in Middlebury, accepted yard waste materials within Addison County, but these materials were burned.[82] The

---

[79] ACSWMD "Annual Report". 2006. 10.
[80] ACSWMD. "SWIP." 24.
[81] ACSWMD "Annual Report." 10.
[82] ACSWMD. "SWIP." 23.

Middlebury stump dump was closed down because it was difficult to manage and staff.[83] In an effort to address frequent resident requests for better disposal options for their yard wastes, the ACSWMD proposed two options for managing yard wastes in their 2006 Solid Waste Implementation Plan. The first option was the collection of yard wastes in roll-off containers located at the Transfer Station that would then be shipped to a composting facility. The total estimated cost of this option was $9,850. A second option was the development and construction of a yard waste-composting site within the ACSWMD. No cost estimate was included in the District report.[84] In 2006, with financial support from the Vermont Agency of Natural Resources, the District began to accept leaf and yard waste at the Transfer Station from businesses and residents. These materials are hauled to the composting facility at Vermont Natural Ag Products.[85]

The ACSWMD has worked hard to develop programming to encourage the diversion of residential and commercial organic materials from the waste stream. The section below highlights the strengths and successes of the ACSWMD's programs and identifies some opportunities for growth.

Successes[86]

- Tiered pricing schedule
- Subsidies for home composters and kitchen compost bins
- Subsidies for cordless electric mowers
- Collection of residential organics at the transfer station free of cost
- Pilot commercial organics program

---

[83] Personal communication, Don Maglienti, 2006.
[84] ACSWMD. "SWIP." 23.
[85] ACSWMD. "Annual Report." 9.
[86] ACSWMD. "SWIP." 22-24.

- Distribution of educational materials related to composting and processing of yard waste through their "New to Reuse" newsletter
- Education-based programming in local schools

Barriers

- Centralized composting facility managed by the ACSWMD
    - Costly to staff and manage (operationally and logistically difficult)
    - Curbside collection costs are very high
    - Requires land to house a composting facility
    - Compacted food scraps can generate odorous liquids that leak from collection vehicles
    - Collection containers must be cleaned
- Commercial composting facility and collection system managed by the private sector
    - Issue of contamination and poor quality organic material
    - Employee participation in commercial composting programs
    - Compacted food scraps can generate odorous liquids that leak from collection vehicles,
    - Collection containers must be cleaned
    - Issues of sustainability during management changes at businesses

Recommendations

- **Identify the barriers to residential and commercial composting.** We developed a questionnaire that will be distributed to District residents within the coming months to gather information on awareness, behavior and barriers to participation in ACSWMD programs (*Appendix E*). In addition, we surveyed local restaurants to determine their receptiveness to a composting program (*Appendix F*). This information can be used to create a list of criteria that a residential and commercial composting program must have to be successful.

- **Focus efforts on expanding the commercial composting program.** Targeting programming at high-volume organics producers rather than individuals will have more of an impact on the waste stream.
- **Encourage the private sector to fill service gaps.** Expand pilot program in which private haulers pick up commercial food wastes and transport those to private farms and composting businesses. The opportunities include reducing the logistical and operational costs of the ACSWMD having to collect and process wastes and encouraging a network of stakeholders. As the market for organic wastes expands, it becomes more profitable to operate a commercial composting facility.
- **Create and support partnerships** between school/commercial kitchens and farms, commercial composting operations, or community compost piles to minimize transportation distances and reduce collection costs. The quantity of food scraps and other organic materials generated at commercial sites and the distance between generators has the greatest impact on the collection costs of commercial organics.[87] Therefore, in a rural state like Vermont, curbside collection of commercial and residential organics and processing them in a centralized composting facility within Addison County may not be a cost-effective strategy. In addition, the substantial land requirements for composting infrastructure and the high cost of staffing such a facility make a partnership with the College composting facility or another already existing composting program a

---

[87] US EPA. "Organic Materials Management Strategies." 30.

more feasible option. After developing a composting program to process its own organic materials, the University of Maine at Orono began accepting leaves from surrounding communities and found that it incurred no additional costs by doing so.[88]

- **Focus on finding economic and social incentives to improve participation.** Education based programming plays an important role in creating a well-informed community. However, education alone is an ineffective strategy for encouraging behavior change. Instead, the barriers to sustainable behavior need to be identified and incentives need to be developed to directly address these barriers. More often than not, economic incentives or disincentives are sufficient to change behavior. Creating social norms by publicizing sustainable behavior and recognizing those that participate in these behaviors can also be an effective strategy.[89]
- **Continue performing one-on-one waste audits for high impact businesses** (i.e., hotels, retailers, restaurants, grocery stores, and business services companies) to help them identify areas where industrial and administrative organic wastes can be reduced or eliminated. A waste audit highlighting the areas where manufacturers and businesses generate waste will encourage business owners to cut back because it often reduces costs. Businesses that increase recycling rates can save 20-50% off their garbage bills.[90] Following a waste audit Quaker Oats reduced its waste stream by over 90%, allowing them to reduce production costs considerably.[91]

---

[88] Ibid., 25.

[89] McKenzie-Mohr, Doug and Smith, William. "Fostering Sustainable Behavior: An Introduction to Community Based Social Marketing." 10 December 2006. <http://www.cbsm.com/members/world.lasso?user=121006.797645040483519334>.

[90] "King County launches campaign to improve business recycling rates." November 10, 2006. 12 November 2006. <http://dnr.metrokc.gov/dnrp/press/2006/1110business-recycling-campaign.htm>.

[91] Connett and Sheehan, 9.

- **Provide incentives for commercial organics generators** to improve source separation. Such incentives might include a plaque for restaurants or grocery stores that establish successful organics programs, a grading system to rate local businesses based on their organics diversion rates, or benefits/incentives for individual employees that demonstrate commitment to their employers' organics program. Businesses in King County, Washington are encouraged to apply for the "Best Workplaces for Recycling" list that recognizes companies that serve as recycling role models for other businesses in the community.[92] A similar list could be created in Addison County that publicly recognizes businesses that have successful programs in place and encourages information exchange between businesses in the community.
- **Organize a garbage lottery** to encourage source separation at the individual level. A household is selected at random and their garbage is collected and examined for any recyclables. If it has been sorted properly, the family wins $1,000. A garbage lottery in Rockford, Illinois helped the town increase its recycling rate fourfold.[93] This could be designed specifically with organics in mind by stipulating that any bag containing organics is sufficient grounds for disqualification.
- **Continue to support home composting** by subsidizing home composters and providing technical assistance.
- **Reduce the capacity of residual waste bags or bins** and require haulers to increase the differentials in their tiered pricing schedules to encourage residents to find ways to

---

[92] "King County launches campaign to improve business recycling rates."

[93] Connett and Sheehan, 9.

reduce the amount of residual waste they produce and thereby divert more organics from the waste stream.[94]

- **Establish social norms** by allowing people to make their behavior public. By distributing "We Compost!" bumper stickers to residents that purchase and use home composters, they are able publicize their behavior and establish composting as a social norm within the community.
- **Focus on using schools as models of Zero Waste programs** by encouraging on-site composting and promoting programs that extend beyond education to include behavior change. For example, the EPA's Pack a Waste Free Lunch Program is a fun way to encourage students to pack lunches that reduce waste.[95] To ensure participation of all the students, encourage vermiculture composting within classrooms or on-site composting programs at all local schools. Engage teachers, students, and administrators in the process and emphasize the educational opportunities in establishing a school composting program.
- **Increase exposure** at community and other promotional events. For example, some municipalities have organized Just Say Mow! programs to promote grasscycling and mulching of yard wastes.
- **Support policy changes** at the state level. Develop partnerships with environmental organizations (e.g. Toxics Action Center) and other waste management districts to push for policy changes at the state level. Leaf and yard waste is already banned from landfills in Vermont.[96] A state-wide ban of all organics would improve local markets for material

---

[94] Ibid.

[95] US EPA. "Educational Resources: Pack a Waste-Free Lunch." 12 October 2006. <http://www.epa.gov/epaoswer/education/lunch.htm>.

[96] Personal communication, Teresa Kuczynski. 2006.

recovery and put the necessary pressure on district managers, haulers, business owners, and residents to explore innovative disposal alternatives.

3.2 Construction & Demolition (C&D)

Background

Unlike other forms of municipal solid waste, C&D debris is not federally regulated except to the extent that landfills must follow a few basic standards outlined in the *Federal Register*.[97] What constitutes construction and demolition waste, therefore, differs by state across the nation. Within New England the definition of C&D waste is relatively uniform; the only exception being that Connecticut has no set definition.[98] In general, C&D waste consists of what is left over from demolition, construction, and renovation projects.[99] For Vermont in particular, and for purposes of this study, C&D waste is defined as:

> "Waste derived from construction or demolition of buildings, roadways, or structures. Includes furniture and mattresses. Does not include asbestos waste, regulated hazardous waste, hazardous waste from conditionally exempt generators (CEG's), or any material banned from municipal waste disposal."[100]

According to EPA regulation, this debris is disposed of in either municipal solid waste landfills or specialized C&D landfills.[101] Within Vermont, 90,000 tons of C&D debris ends up in the states two municipal solid waste landfills each year, making up 20% of the state's total waste stream by volume.[102] Though unregulated, some of this debris may also end up in un-permitted landfills, outside of state boundaries, or at combustion facilities.[103] Nationally, roughly 25% of C&D waste is recycled despite estimates that 90% of this waste could potentially be reused.[104]

---

[97] US EPA. "RCRA in Focus: Construction, Demolition, and Renovation". 2004. U.S. Environmental Protection Agency. 5 November 2006. <http://www.epa.gov/epaoswer/hazwaste/id/infocus/rif-c&d.pdf>. 5.

[98] Toxic Action Center: Construction and Demolition (C&D) Debris, State by State, 1.

[99] Ibid.

[100] Ibid.

[101] US EPA. "Construction and Demolition (C&D) Debris: C&D Debris Disposal". 2006. U.S. Environmental Protection Agency. 15 November 2006. <http://www.epa.gov/epaoswer/non-hw/debris-new/disposal.htm>.

[102] Toxic Action Center: Construction and Demolition (C&D) Debris, State by State. 3.

The average statewide recovery rate for C&D debris in Vermont is 37%.[105] Despite limitations to C&D recycling statewide, the overall number of C&D recycling facilities has been growing rapidly, with an estimated 1,800 nationwide facilities in 1996.[106] As the market continues to grow for reused and recycled products, however, the demand for these facilities will increase as well.[107]

C&D diversion tactics exist nationwide, but vary project to project by contractor. Successful examples for C&D waste diversion include a recent project to create the Bagley Downs Apartments, a series of 30 affordable student housing units for the University of Oregon.[108] This project utilized innovative methods to achieve its 73% recovery rate. By relocating entire buildings rather than demolishing and reconstructing them, the project saved the University of Oregon in demolition costs while also preserving community landmarks.[109]

Another impressive example exists in Salem, Oregon where Marion County and Salem Area Transit saved over $160,000 in their demolition of the Marion County Senator Block by diverting demolition materials from disposal and also using the project as a tool to educate the public on recycling.[110] The county advertised the project's recycling rate around the site as well as through television and radio ads. These efforts, along with salvaging usable material prior to demolition and promoting recovery of metals, concrete, and asphalt, enabled the project to achieve an 82% recovery rate.[111]

---

[103] US EPA. "Construction and Demolition (C&D) Debris: C&D Debris Disposal".

[104] Toxic Action Center: Construction and Demolition (C&D) Debris, State by State. p.3

[105] "Construction and Demolition Waste landfills". 1995. ICF Incorporated. 15 November 2006. <http://www.epa.gov/epaoswer/hazwaste/sqg/const/cdrpt.pdf>, 13.

[106] Ibid.

[107] US EPA. "Characterization of Building Related Construction and Demolition Debris". 1998. U.S. Environmental Protection Agency. 5 November 2006. <http://www.epa.gov/epaoswer/hazwaste/sqg/c&d-rpt.pdf>.

[108] US EPA. "Building Savings: Strategies for Waste Reduction of Construction and Demolition debris from Buildings". 2000. United States Environmental Protection Agency. 15 November 2006. <http://www.ilsr.org/recycling/buildingdebris.pdf>, 3.

[109] Ibid.

[110] Ibid.

With these models in mind, we hope to provide recommendations for the ACSWMD to encourage increased C&D diversion within the District. Using similar tactics to those noted, we can work towards a Zero Waste strategy for Addison County, along the way assisting ACSWMD in meeting its current 50% diversion goal.

ACSWMD C&D Disposal

Due to financial drawbacks, as of March, 2001 ACSWMD no longer recycles construction and demolition materials.[112] By 2001 estimates, 4,459 tons of C&D materials were processed at the transfer station, with an additional 25 tons being hauled to out of district facilities.[113] According to staff estimates, one in ten C&D loads contain up to 5% useable or salvageable material.[114] Though the District supports local reuse businesses and operations such as Recycle North and Vermont Business Material Exchange, staff and space limitations persist and inhibit greater diversion of these materials on site at the transfer station itself.[115]

By encouraging the reduction in the amount of C&D waste generated on a given project, ACSWMD can divert a greater volume of the waste stream while also potentially saving money and forgoing regulatory burden for contractors and haulers.[116] Vermont in particular is reported to have some of the highest C&D waste disposal costs in the country, with fees ranging from $65 to over $100 per ton disposed.[117] Recovered materials can also be donated to charities and non-profit organizations, resulting in a tax benefit for the hauler or contractor.[118] Also, deconstruction and selective demolition methods divert materials from disposal, therefore providing business opportunities within the local community.

---

[111] Ibid.

[112] ACSWMD. “SWIP.” 21.

[113] ACSWMD “Annual Report.” 2006.

[114] ACSWMD. “SWIP.” 22.

[115] ACSWMD. “SWIP.” 22.

[116] US EPA. “RCRA in Focus: Construction, Demolition, and Renovation”. 5.

[117] Toxic Action Center: Construction and Demolition (C&D) Debris, State by State. 3.

Exact amounts of diverted and recycled C&D are not yet reliable. Though 774 tons of C&D were reported to have been recycled during 2001, tracking systems are not as well established with contractors as they are with licensed haulers. Many contractors self haul C&D generated by their projects and therefore the amount of generated and diverted C&D waste is not reported to the District. The District Board, however, has recently amended its Waste Management Ordinance and is beginning to monitor self-hauling contractors. Now, once contractors exceed 100 tons a year, they will be required to obtain a Commercial Hauler's License and diversion rates of C&D can be more closely monitored.[119]

A recent victory for increased C&D diversion for ACSWMD is the inclusion of two new Reuse Centers in its 2007 Annual Budget, one for C&D debris and another for household goods.[120] District staff have been attempting to garner support for such centers since 1990, writing grant applications for the establishment of the Addison County Community Action Group (ACCAG) Reuse Center for textiles and electronics.[121] For C&D, however, the District became impatient waiting for a state-wide C&D sorting facility. The establishment of a new, local facility will allow staff to pull out reusable materials on site for display to local customers. Since contractors will now have an opportunity to bring separated C&D to a local drop-off free of charge, incentive should exist to encourage separation of the materials on site. If contractors choose not to participate they will be losing out on free disposal and low-cost trucking of reusable materials.

---

[118] Toxic Action Center: Construction and Demolition (C&D) Debris, State by State. 1

[119] Personal communication, Teresa Kuczynski.

[120] Ibid.

[121] Ibid.

In order to provide a more local model for the ACSWMD, Middlebury College C&D policy and implementation will be reviewed and amended for application within the greater District.

Local Model for Policy: Middlebury College (VT) C&D Diversion Policy

Middlebury College is situated within the ACSWMD and promotes itself as an institution "committed to environmental mindfulness and stewardship in all its activities."[122] To support this mission, the College has instituted policies to address C&D waste management. It requires contractors to manage C&D waste responsibly, diverting as much as possible from the waste stream during the building process. These practices, called the Construction and Demolition Best Practices Policy (*Appendix E*), include a pre-demolition audit, C&D waste management by material, an abatement plan, hazardous wastes accepted by the ACSWMD, contractor accountability, and a series of consequences in the form of a fine structure.[123] A review of this best-practices policy shows a potential for Middlebury College to further reduce its own C&D waste while also providing a basic C&D diversion model for future building projects within the ACSWMD.

The pre-demolition audit includes documentation of all on site materials by location and quantity. Such an audit is conducted by either the contractor themselves or a salvage/reuse expert chosen by the College. It is at this time that the College determines what materials can be reused within the community and assesses the potential need for a hazardous waste abatement plan.

---

[122] Middlebury College Trustees. "Construction and Demolition Waste Management Best Practices. June 1995. <http://www.middlebury.edu/administration/enviro/policies/c_and_d_recycling_guidelines.htm>.

[123] Ibid.

Management of College C&D waste differs by material, but Middlebury College works in conjunction with ACSWMD to recycle as many materials as it sees possible. Along with a material by material discussion within the C&D best-practices policy, the College also discusses actions taken for each material along with future strategies to improve the management of the material. For example, waste management for clean wood (including pallets) and furniture not reclaimed within the College community are recycled via the ACSWMD. Concrete, asphalt, and brick are also either reclaimed or recycled on site or within the ACSWMD, while plastics, beverage/food containers, and cardboard are recycled by the College program. Plate glass is grinded and recycled by Marcelino and Co., Inc. while metals (aluminum, steel, fasteners, and metal studs) are collected by All Metals Recycling.

The next practice of the College C&D policy includes hazardous waste management with a subsequent abatement plan and disposal via ACSWMD. The Transfer Station prohibits certain items from C&D loads and the College must meet these specifications prior to disposal.

Contractor accountability requires that each contractor issue a plan for handling materials (hazardous and non-hazardous) on site. Such a plan includes materials, lists of uses, material safety data, storage on site, and a disposal plan. Such documentation is required prior to any payment to the contractor. Failure to adhere to these predetermined practices result in $1000 per-incident fine by Middlebury College with additional fines to any outside contributing parties. Further, responsible parties will pay the cost of cleanup along with an additional 15% of that cost.

Though the College policy seeks to determine secondary markets for carpeting and padding in its building projects, it is the only salvageable material specified to be landfilled. The College has made great efforts to promote environmentally sound building practice, but markets *do* exist for carpeting materials and this is one area for improvement in the College's C&D diversion practices.

Future Recommendations for Carpet Reuse

Annually, the amount of carpet generated by each person in the United States is about 13 pounds.[124] The 5 billion pounds of carpet disposed each year comprise 2.4% of the municipal solid waste (MSW) stream. 75% of that carpeting is residential while 25% is commercial.[125] Since nylon fiber is a valuable polymer and accounts for anywhere from 20-60% of the material within a given carpet, a business market has arisen for recycled carpets.[126] Along with creating new carpet fiber from used carpets, technologies such as GEOHAY® (a product used instead of baled hay or straw to protect against sediment entering water bodies) and Nyboard (a nylon based substitute to be used for a variety of building materials) show promise for further use of carpet materials.[127]

Environmental Recovery and Consolidation Services (ERCS) offers a potentially viable solution for the removal, collection, and recycling of used and worn carpet.[128] Their services apply to all brands of residential and commercial broadlooms (i.e. wide loom carpeting) and carpet tiles, while also offering consulting services to businesses interested in all aspects of recycling carpet (manufacturing, collection, processing and making products from discarded carpet). ERCS has been expanding its collection network with hopes of opening a processing facility in the Northeast.[129] The closest collection facility to Middlebury, Vermont exists in

---

[124] Northeast Recycling Council, Inc. Carpet Discussion. September 28, 2006.
[125] Ibid.
[126] Carpet America Recovery Effort. 29 November 2006. <http://www.carpetrecovery.org/>.
[127] NYCORE Advancing Materials. 29 November 2006. <http://einnovationsinc.com/technology.html>.
[128] Environmental Recovery & Consolidation Services LLC. 29 November 2006. <http://www.carpetrecycling.com/index.htm>.
[129] Carpet America Recovery Effort.

Boston, Massachusetts, but if ERCS were to expand its collection facilities as planned, the College could look into forging a partnership to divert carpets in the future.

Implementation of C&D Best Practices Policy: Starr-Axinn and Hillcrest Projects

The 2008 opening of the Axinn Center at Starr Library, which will house a center for literary and cultural studies along with the history department, will provide many needed offices and teaching spaces for Middlebury College students and faculty.[130] Though much of the demolition for the "Starr-Axinn" project has been completed to date, the diversion tactics implemented in this project could serve as a model for application within the greater ACSWMD.[131]

Over the duration of the project roughly 300 men and women will have worked on site, the vast majority of them Vermonters.[132] With the rising cost of fuel, the scarcity of landfill space, and the rising value of recycled material, the practice of demolition and landfilling has changed to a practice of salvage. Copper, wire, metal, clean wood, and concrete debris are processed and sold in the recycled commodity market.[133]

Earth Waste Systems, Inc. is the primary debris management contractor for the Starr-Axinn project.[134] Based out of Rutland, Vermont, Earth Waste's approach to environmental "re-purposing" extends into each of its specialized divisions: Metal Recycling, Demolition, and Foreign Auto Parts.[135] For this particular project, Earth Waste is supported by Engelberth

---

[130] Knowledge Without Boundaries, The Middlebury College Strategic Plan. 2006. 29 November 2006. <http://www.middlebury.edu/NR/rdonlyres/B83853CF-01C6-4C46-9453-A1BFA34B071D/0/MiddleburyStrategicPlan2006.pdf>. 60.

[131] Personal communication, Mark Tighe, 2006.

[132] Facilities Services Newsletter, August 14, 2006.

[133] Personal communication, Mark Tighe.

[134] Personal communication, Ed Grimley, 2006.

[135] Earth Waste Systems, Inc. 29 November 2006. <http://www.earthwastesystems.com/>.

Construction, the primary building contactor for Starr-Axinn, who is tracking and removing debris from selected areas of the building.[136]

Middlebury College has also recently begun renovation and construction of Hillcrest Hall, preparing for the 9,700 square foot Hillcrest Environmental Center by June 2007.[137] Under the contractor HP Cummings, this project calls for deconstruction of the south annex, renovation of the original building and western addition, and construction of a two story addition to the south. Striving for environmental excellence, the College is hoping to obtain Leadership in Energy and Environmental Design (LEED) certification from the United States Green Building Council (USGBC) for this project.[138] LEED certification is a national standard for developing high performance "green" building, calling for a minimum diversion rate of 75% for waste overall.[139] As such, HP Cummings is tracking all C&D waste and materials from the building for purposes of complying with both the College's C&D best practices policy along with increasing diversion for LEED certification (*Appendix F*). As of December 6, 2006 the project has achieved 83.69% diversion of waste materials from the site.[140]

Due to the financial benefits of the C&D best-practices policy along with the financial incentive and market for recycled products, the College has been steadily increasing C&D diversion over the years.[141] Encouraging similar tactics within its member municipalities, ACSWMD could maximize its diversion of salvageable C&D materials and readily move towards a sound Zero Waste policy. Below is a summary of current successes in C&D diversion, potential barriers to increased diversion, and recommendations to be made both on the district level and to individual haulers and contractors disposing of C&D waste within the District.

---

[136] Personal communication, Ed Grimley.

[137] MiddPoints. July 27, 2006. <http://www.middlebury.edu/NR/rdonlyres/FD05CDCA-2051-4361-A7B6-48A1F3BF55F3/0/July2706.pdf>. 2.

[138] <http://www.usgbc.org/>

[139] Ibid.

[140] Hillcrest Construction Waste Management Plan, 2006.

[141] Personal communication, Tom McGinn, 2006.

Successes

- Adoption of C&D Reuse center within the ACSWMD 2007 Annual Budget
- Financial incentive provided by free disposal and low-cost trucking resulting from C&D reuse center
- Individual employee efforts at the Transfer Station to remove salvageable materials prior to disposal

Barriers

- Cost of collecting, sorting, and processing
- The low value of the recycled content material in relation to the cost of virgin materials
- Low cost of C&D debris landfill disposal[142]

Recommendations

Identify major C&D producers and encourage high volume generators to participate in upcoming C&D Reuse Center diversion. By targeting these generators in particular the ACSWMD can increase awareness on C&D disposal and promote a lucrative local business for salvageable C&D material.

- **Provide information** to municipal haulers and contractors about salvageable materials and tactics for C&D diversion. Since these are the major players in the construction, demolition, and disposal processes, informing them about C&D disposal and the potential market value of disposed materials would prove mutually beneficial for both the

---

[142] US EPA. "RCRA in Focus: Construction, Demolition, and Renovation."

ACSWMD (by diverting these materials from landfills) and the haulers/contractors (by increasing revenue).

- **Encourage contractor and hauler accountability** by monitoring incoming C&D waste and reporting back on disposal loads containing salvageable material. Institutions such as Middlebury College impose fines on contractors that do not properly divert recyclable materials, but, in order to do so, negligent disposal methods must first be reported. By promptly reporting back on haphazard sorting methods the ACSWMD can increase C&D diversion in the future by subjecting individual haulers and contractors to such penalties.

Strategies for ACSWMD to Individual Contractors

- **Include C&D recovery plans in project design.** By planning for diversion from the outset, contractors can take proper precaution to ensure that predetermined policies are adhered to. For example, the Middlebury College C&D best practices policy applies to every construction project on campus and requires that contractors recycle, divert, and dispose of building materials in a manner that is consistent with institutional goals.
- **Include recovery requirement and goals in project specification and contracts.** For example, the Marion County project in Salem, Oregon used research prior to construction and demolition to identify a 90% diversion potential for the C&D waste, thus motivating the project to proceed in a manner that would enable that goal to be reached.[143]
- **Educate contractors and crews on materials recovery techniques.** For the construction of Erickson's Diversified Corporate Headquarters in Hudson, WI, Erickson's planned to incorporate material recovery efforts even though it expected to pay more than if it disposed all materials generated. By providing detailed instructions to

---

[143] US EPA. "Building Savings: Strategies for Waste Reduction of Construction and Demolition debris from Buildings". 3.

workers on site, Erickson's was able to source separate materials during the construction, save money, and divert 69% of project debris.[144]

- **Hold subcontractors accountable.** For the renovation of Whole Foods Market Headquarters in Austin, Texas, Whole Foods did not process payment until contractors submitted forms summarizing C&D recovery efforts. The reuse and recovery of materials throughout the process saved the project $57,000 while also qualifying the company for an $8000 tax deduction.[145] Similar tactics could be taken by to ensure accountability within the ACSWMD.
- **Provide incentive for recovery.** As an incentive to encourage recovery, the owners of the Four Times Square office building chose to allow their contractors to retain revenues and savings from materials recovery. The project included a materials recovery plan from the outset and achieved an overall 58% diversion rate.[146]

---

[144] Ibid.
[145] Ibid.
[146] Ibid.

4. OUTREACH

4.1 Outreach Plans and Goals

The path to Zero Waste is filled with people and systems that are pursuing diversion programs and understand the importance of getting back in touch with the natural world. In studying natural systems we see that nature alone has effectively implemented a Zero Waste program. In the context of this paper, we have been examining Addison County specifically and where its current programs fall in relation to the path to Zero Waste. ACSWMD currently provides an abundance of options through which locals can responsibly dispose of a wide range of consumer waste products, but the diversion rate of the region shows there is much room for growth and improvement through their outreach program. In her book *Garbage Land,* Elizabeth Royte claims that "it would take laws…sharp penalties, and massively collective consumer action to induce change"[147] but this does not minimize the importance of outreach and education. Education provides the foundation for self-reflection and the assumption of personal responsibility; people need to become aware of their own place in the system before they are ready to assume responsibility and lobby for change at a larger scale. Without this, the dream of Zero Waste can never become a reality.

The first step in reaching out to people is to ensure that they have an understanding of what a Zero Waste system is and how is it tied to the concept of individual responsibility for waste produced. People need to be made aware of the systems in place to help process waste, educated as to why they should use these systems, and exposed to the power that they wield as consumers. Instinctively, people might resist an additional composting container in their kitchens, for example, if they live in small, expensive apartments in a city, but in an age of both environmental crises and instantaneous information availability, there is no compelling reason not to move towards ideals such as that of Zero Waste. It is an economically viable model and although it does require some additional effort on the individual level, as well as the redirection of resources to accommodate the diversion of waste, these are minimal disadvantages for an outcome that will mitigate many environmental problems.

---

[147] Royte, Elizabeth. Garbage Land: On the Secret Trail of Trash. New York: Little, Brown & Company, 2005, 276.

Given the importance of outreach and education we have developed a questionnaire (*Appendix G*) which the ACSWMD will use to gather information on awareness, behavior, and barriers to participation. The questionnaire was designed to collect information in three major categories:

- **Awareness of programs in place:** How aware are community members of the facilities and programs offered by the ACSWMD and how is this awareness linked to geographic location? This will help us to identify key areas in the District in which we should target outreach programs.
- **Current diversion habits:** What are the current diversion habits and behaviors of the citizens in the ACSWMD for certain products? This will identify which particular products or groups of products that can be processed by the ACSWMD need to be better advertised and targeted in outreach efforts by the ACSWMD.
- **Obstacles and motivations:** What are the current obstacles experienced by individuals during the process of separating their waste? We want to identify key barriers to responsible disposal and diversion among people who don’t currently recycle, and the motivations for those who do responsibly process their waste.

By collecting this information from the entire community, the ACSWMD will be in a position to work towards the goal of Zero Waste by improving their rate of diversion. "Knowing which factors are most important in distinguishing individuals who have adopted a sustainable behavior, from those who have not, is an essential first step."[148] Perhaps more importantly, this information can be strategically used to frame future education and outreach efforts. Educating people about the importance and necessity of embracing Zero Waste has merit, but it will be a futile exercise if it is not framed and presented in the context of the specific community's concerns and values.

Taking a step back and looking at the goals and context of our survey, it is helpful to reference the concept of community-based social marketing, touted by *Fostering Sustainable Behavior* as "an attractive compliment to regulatory and information intensive campaigns."[149] This pragmatic approach involves four main steps: identifying barriers and benefits to sustainable behavior, designing a strategy that utilizes behavior change tools, piloting the strategy with a small segment of the community, and evaluating the impact of the program once it has been implemented on a community-wide scale.[150] The proposed questionnaire fits right into the first step towards a Zero Waste goal using community-based social marketing, and will hopefully provide the ACSWMD with a tangible resource with which they can modify their program. The questionnaire will be available to all citizens of Addison County as a link on the ACSWMD's website. It will be advertised in their upcoming newsletter, and for people without access to the internet, a paper copy will be mailed to them if they call ACSWMD and request it. An incentive to filling out the surveys will be offered in the form of five $20 food vouchers to Middlebury Natural Foods Co-op.

---

[148] McKenzie-Mohr and Smith, 42.
[149] Ibid., 15.
[150] Ibid.

One key characteristic of Addison County that can't be overlooked is the advantage it has in being comprised of small communities. People in more intimate communities have a stronger desire to be seen as consistent by and with the others in the community and a greater level of commitment can be reached by citizens who can keep a tab on each other and work together to benefit their society.[151] This idea can be taken further by the ACSWMD by helping with the creation of 'community block leaders' who volunteers to assess the progress of their sections of community and provide feedback to the ACSWMD.[152] For example, volunteers at the Weybridge Transfer station, where they sort through recyclables, are an invaluable resource, and an "intercept survey" done there might afford the ACSWMD some clues as to how to mobilize community efforts.[153] There are many ways in which this survey can be a springboard for community-regulated changes in social behavior, and this is the main tool we hope to provide for the District.

Besides this general questionnaire, the second goal of our efforts was to survey local restaurants to determine their receptiveness to a composting program, and how much effort they are willing to put in to comply with the high standards required for their participation in such a program. We surveyed these restaurants (*Appendix H*) independently of ACSWMD because the District is currently taking a step back from a similar program which they had to shut down due to the high levels of contamination. We hoped to demonstrate to ACSWMD and Casella a strong willingness by the local restaurants to comply with these standards, and convince them to accelerate the timetable in re-introducing the composting option to local businesses. Our aim was to illuminate the most prevalent misconceptions and provide ACSWMD specific areas in which they can focus their education and outreach efforts.

---

[151] McKenzie-Mohr and Smith, 48.

[152] Ibid., 97.

[153] Personal communication, Nadine Barnicle, 2006.

4.2 Results

As the community-wide questionnaire has not yet been distributed, we are unable to present its results. However, basic results from the restaurant survey are presented below:

- Of the 10 eating establishments surveyed, only 3 presently compost their waste, and all 3 have a relationship with a pig farm where they send their food waste
- 2 of these 3 gain from this relationship by bartering produce
- Of the 7 that do not compost, 4 cited lack of space and odor as the main reasons, 2 cited time constraints, and 1 reported that since it had never been brought up as an issue, no one was interested
- When asked if an externally-implemented program would motivate the employees into action, 2 answered in the negative, 3 said maybe, and the remaining 2 answered positively. The other 3 already compost, but seemed excited about the prospect of getting everyone involved
- When asked about the current employee perception of composting, 6 out of 10 said they were either: ‘interested and willing’ or ‘interested but there is not enough incentive’
- When asked if example incentives would encourage the employees, 7 out of the 10 respondents answered ‘maybe’ or ‘yes’

If the ACSWMD implements a commercial composting program for all eating establishments in Middlebury, they could further create a ranking system to award the restaurants that best comply with their composting regulations, once the program is underway. This ranking system could be showcased physically in the restaurants in the form of a plaque, and individual employee benefits or incentives could be encouraged. It could also be added to write-ups / ads about the local restaurants in newspapers, tourist brochures, and "What to do around Middlebury" handed out to parents and new students of Middlebury College.

Observations

- Establishments do not have enough information about composting
- They would be willing to attempt it, especially with external help and incentives
- Space and odor were the largest issues
- All of them recycle, because it compulsory

Recommendations

- Develop a commercial composting education package, and stress on the fact that it will save them money
- Think about creating a co-operative commercial composting site which several restaurants could share
- Help them understand how little space is actually needed, and how to compost effectively without emitting a bad odor
- Keep working with state-wide organizations like the Toxics Actions Center to push for banning organics in landfills, and establishing a compulsory commercial composting program just as recycling is now mandatory and successful

Barriers

- Financial constraints of the ACSWMD in compiling an education package
- Finding an appropriate space for a co-operative composting area, and convincing establishments to use it

- Ability to convince establishments to invest time and space into composting, despite incentives
- The time and energy required to affect state legislature and changing of laws

Lastly, we created a page-long article explaining the concept of Zero Waste for the ACSWMD's newsletter (*Appendix I*). This is an effort to introduce the general public to this concept as well as explain the practicality and benefits of working towards such a goal.

5. CONCLUSION

The ways that a community handles its resources and wastes have a significant impact on its long-term health and vitality. Zero Waste offers an innovative approach by adopting a full-systems view of resource management. The transition of numerous communities throughout the world from basic waste-management to the more enduring approach of Zero Waste suggests this is a realistic strategy. The ACSWMD has the opportunity to work towards a Zero Waste model and thus strengthen its member communities.

Within this report, we have identified major gaps in diversion that offer the greatest potential for increasing resource recapture and, thus, the preliminary steps in the movement towards Zero Waste. We recognize organics as one area in which there is major potential for progress on the basis of several criteria (*Table 1*). Additionally, although the State of Vermont does not include construction and demolition debris in the calculation of a district's official diversion rate, we believe it also offers significant opportunity for improvement. The recommendations we have provided in the preceding sections will hopefully allow the ACSWMD to take practical steps in realizing this potential.

Much of the infrastructure necessary to support a Zero Waste program is already in place or in the process of being implemented, such as tiered billing structure, mandatory recycling, pilot commercial composting, and reuse centers. Hence, the ACSWMD should be commended for laying a solid foundation for continued progress towards Zero Waste. However, the ACSWMD faces significant challenges to implementing a Zero Waste program (see Section 2.1). While the ACSWMD cannot overcome some existing barriers alone (i.e. flow control, long term contracts, and limitations as a waste management facility), others are more surmountable (i.e. financing, ideological commitment, consumer and business participation/cooperation). We suggest that the ACSWMD continue to work with other organizations and government agencies like the Toxics Action Center and the CVSWMD to deal with these large-scale issues.

We would like to reiterate that the power of ACSWMD lies in its ability to recapture resources. The other two major components of Zero Waste—consumption patterns and manufacturer liability—are outside the scope of the ACSWMD itself, and therefore can be more appropriately dealt with on a broader scale. True progress towards Zero Waste requires a combination of "bottom-up" and "top-down" approaches.

Ideally, a "bottom-up" approach should begin by educating individuals about the systems in place to help them divert and process their waste, the importance of responsible waste disposal, and the power that they wield as consumers. The survey component of the outreach section in this report is intended to assess the current state of consumer awareness and participation, while the newsletter article is an initial step in educating the general public about the power of Zero Waste.

Another major challenge of Zero Waste is bringing together multiple stakeholders and reaching a consensus. A "top-down" approach, using changes in policies and incentives, provides a strategy for dealing with this obstacle. Ultimately, the power to effect "top-down" changes rests with state and local governments. For example, in Germany, producers are required by law to pick up discarded packaging from retailers.[154] While "top-down" approaches are beyond the scope of this project, the ACSWMD can start to work towards change by serving as a model for others and by lobbying for change.

The successes of the ACSWMD, along with the significant potential for improvement in organics and C&D, offer significant hope for future progress. The ACSWMD holds a key position in the community that allows them to provide a link between all relevant stakeholders—

---

[154] Royte, 262.

citizens, policy makers, producers and manufacturers, and others. True movement towards Zero Waste will ultimately require an ideological commitment to this approach; however, once this transition has been made the ACSWMD can provide an impetus for change in the greater community.

Appendix A: Other Zero Waste Programs Throughout the U.S. and the World[155]

- Canberra, Australian Capital Territory (Australia)
- Carrboro, NC
- Columbia (Canada)
- Del Norte County, CA
- Regional District of Kootenay Boundary, British
- Regional District of Nanaimo, British Columbia (Canada)
- City of Nelson, British Columbia (Canada)
- 48 of the 74 Local Authorities in New Zealand
- City of San Francisco, CA
- San Luis Obispo County, CA
- Santa Cruz County, CA
- City of Seattle, WA
- City of Toronto, Ontario (Canada)
- Seven local councils in the United Kingdom

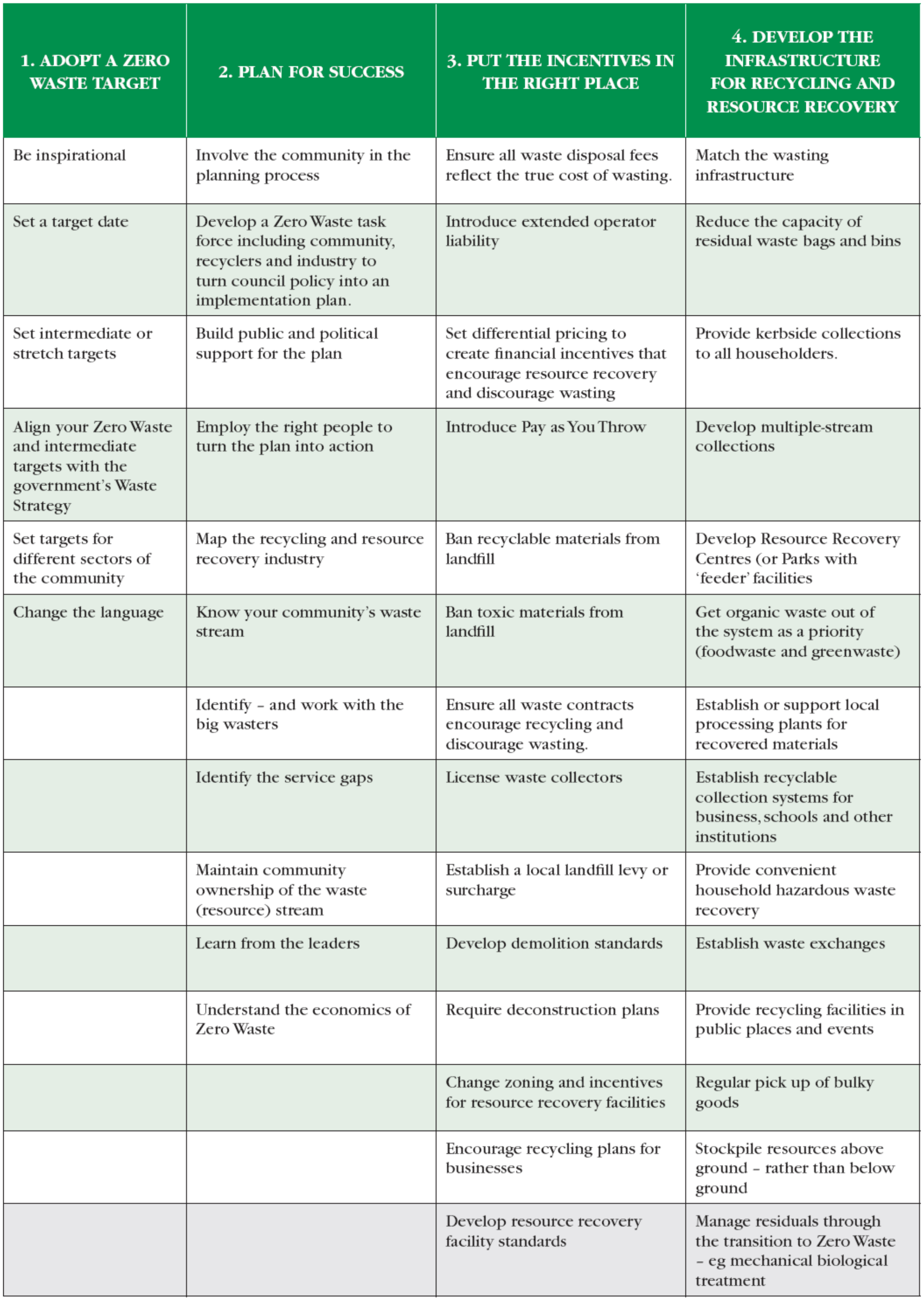
Appendix B: Member Municipalities of the Addison County Solid Waste Management District

- Addison
- Bridport
- Cornwall
- Ferrisburgh
- Goshen
- Leicester
- Lincoln
- Middlebury
- Monkton
- New Haven
- Orwell
- Panton
- Ripton
- Shoreham
- Starksboro
- Vergennes
- Waltham
- Weybridge
- Whiting

---

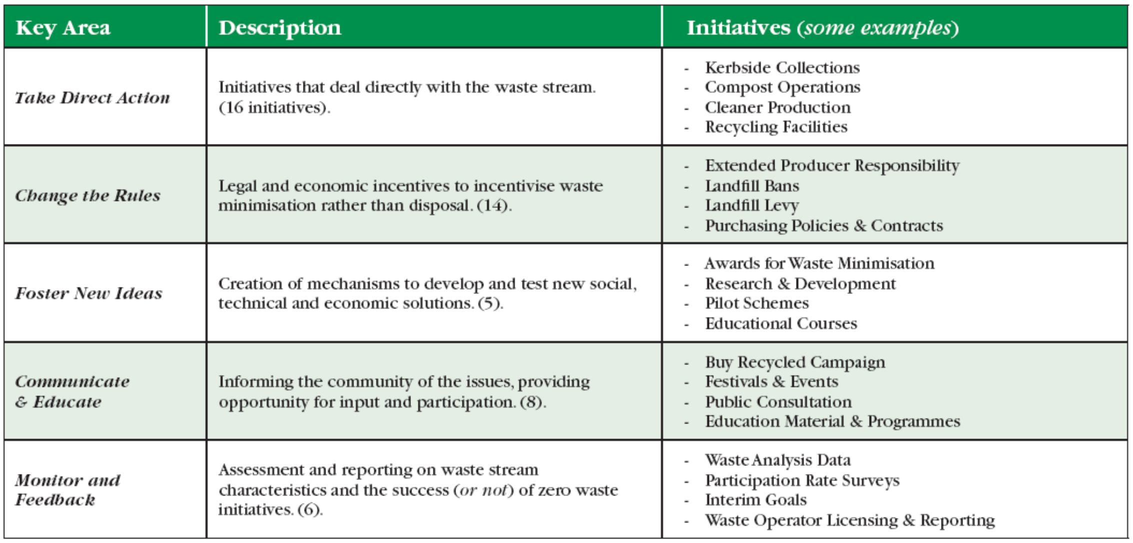
[155] CVWMD. "Intro to Zero Waste."

Appendix C: Key Strategies for Communities Summary Table (taken from Snow and Dickinson, 2003).



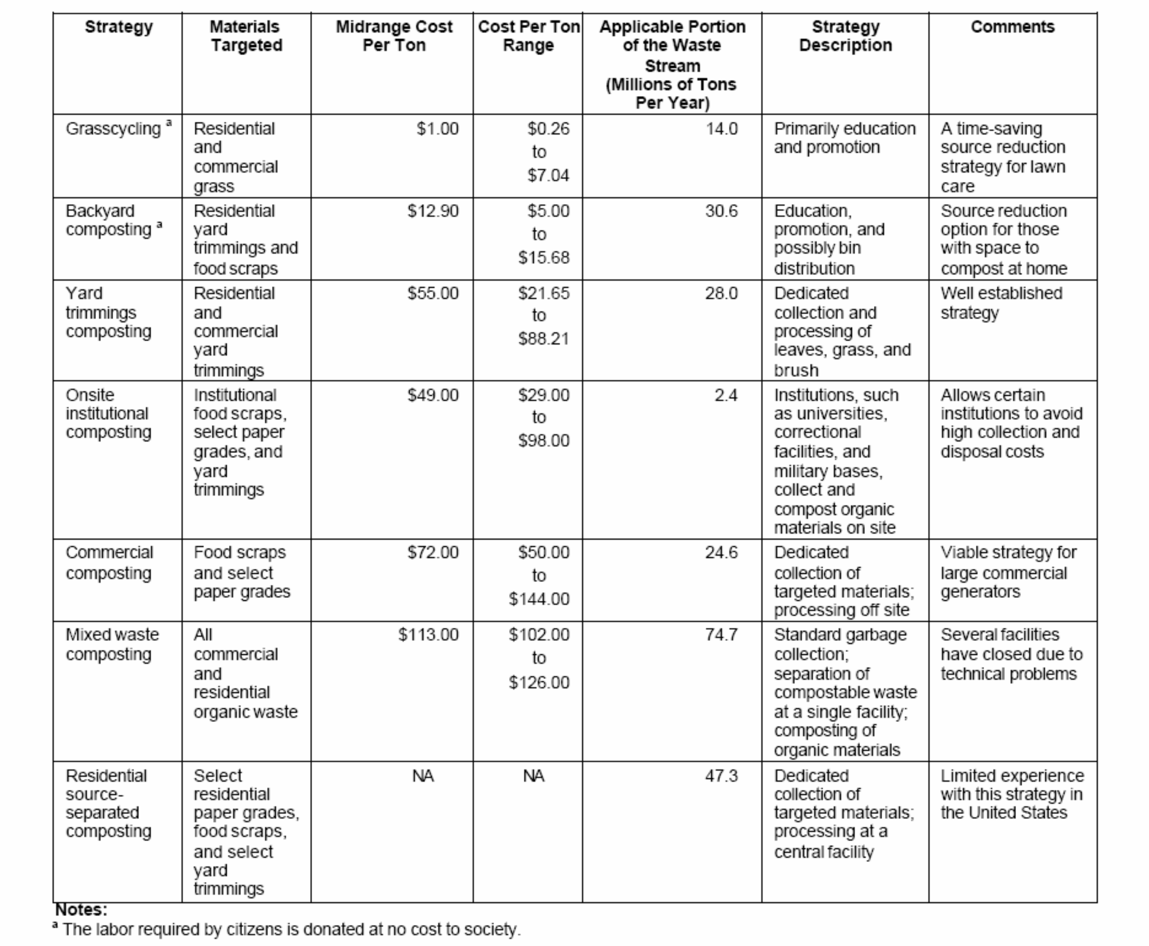
1. ADOPT A ZERO WASTE TARGET	**2. PLAN FOR SUCCESS**	**3. PUT THE INCENTIVES IN THE RIGHT PLACE**	**4. DEVELOP THE INFRASTRUCTURE FOR RECYCLING AND RESOURCE RECOVERY**
Be inspirational	Involve the community in the planning process	Ensure all waste disposal fees reflect the true cost of wasting.	Match the wasting infrastructure
Set a target date	Develop a Zero Waste task force including community, recyclers and industry to turn council policy into an implementation plan.	Introduce extended operator liability	Reduce the capacity of residual waste bags and bins
Set intermediate or stretch targets	Build public and political support for the plan	Set differential pricing to create financial incentives that encourage resource recovery and discourage wasting	Provide kerbside collections to all householders.
Align your Zero Waste and intermediate targets with the government's Waste Strategy	Employ the right people to turn the plan into action	Introduce Pay as You Throw	Develop multiple-stream collections
Set targets for different sectors of the community	Map the recycling and resource recovery industry	Ban recyclable materials from landfill	Develop Resource Recovery Centres (or Parks with 'feeder' facilities
Change the language	Know your community's waste stream	Ban toxic materials from landfill	Get organic waste out of the system as a priority (foodwaste and greenwaste)
	Identify – and work with the big wasters	Ensure all waste contracts encourage recycling and discourage wasting.	Establish or support local processing plants for recovered materials
	Identify the service gaps	License waste collectors	Establish recyclable collection systems for business, schools and other institutions
	Maintain community ownership of the waste (resource) stream	Establish a local landfill levy or surcharge	Provide convenient household hazardous waste recovery
	Learn from the leaders	Develop demolition standards	Establish waste exchanges
	Understand the economics of Zero Waste	Require deconstruction plans	Provide recycling facilities in public places and events
		Change zoning and incentives for resource recovery facilities	Regular pick up of bulky goods
		Encourage recycling plans for businesses	Stockpile resources above ground – rather than below ground
		Develop resource recovery facility standards	Manage residuals through the transition to Zero Waste – eg mechanical biological treatment

5. ENGAGE (AND INSPIRE) THE COMMUNITY	6. WALK THE TALK	7. LOBBY FOR NEW RULES
Publicise the community's Zero Waste policy and communicate the vision	Adopt green procurement guidelines	National landfill levy to help fund community waste initiatives
Provide Zero Waste advisory services for businesses	Establish recycling systems within all Council operations	Extended Producer Responsibility including industry stewardship programmes and container deposit programmes
Promote consumer buying power and behaviour	Link with (and enhance) other initiatives – eg eco-tourism	National landfill bans for recyclable and toxic materials
Collaborate nationally, regionally and with neighbouring councils to provide consistent information		Full cost accounting for waste disposal
Be creative!		National Zero Waste communication campaign linking with community campaigns
Encourage local innovation and participation through a Zero Waste fund		Packaging levy
Develop joint ventures		Minimum recycled content standards
Monitor, measure and publicise the results		Research and development grants/tax incentives
		Mandatory corporate reporting
		Support for Design For the Environment programmes
		Investment in jobs through local reuse, recycling and reprocessing
		Low interest loan fund
		Green procurement guidelines for the public sector
		National measuring, monitoring and reporting on our journey towards Zero Waste



Key Area	**Description**	**Initiatives** (*some examples*)
Take Direct Action	Initiatives that deal directly with the waste stream. (16 initiatives).	- Kerbside Collections - Compost Operations - Cleaner Production - Recycling Facilities
Change the Rules	Legal and economic incentives to incentivise waste minimisation rather than disposal. (14).	- Extended Producer Responsibility - Landfill Bans - Landfill Levy - Purchasing Policies & Contracts
Foster New Ideas	Creation of mechanisms to develop and test new social, technical and economic solutions. (5).	- Awards for Waste Minimisation - Research & Development - Pilot Schemes - Educational Courses
Communicate & Educate	Informing the community of the issues, providing opportunity for input and participation. (8).	- Buy Recycled Campaign - Festivals & Events - Public Consultation - Education Material & Programmes
Monitor and Feedback	Assessment and reporting on waste stream characteristics and the success (*or not*) of zero waste initiatives. (6).	- Waste Analysis Data - Participation Rate Surveys - Interim Goals - Waste Operator Licensing & Reporting

Appendix D: Cost analysis of various management strategies for processed organic material (taken from Organic Materials Management Strategies, 1990).

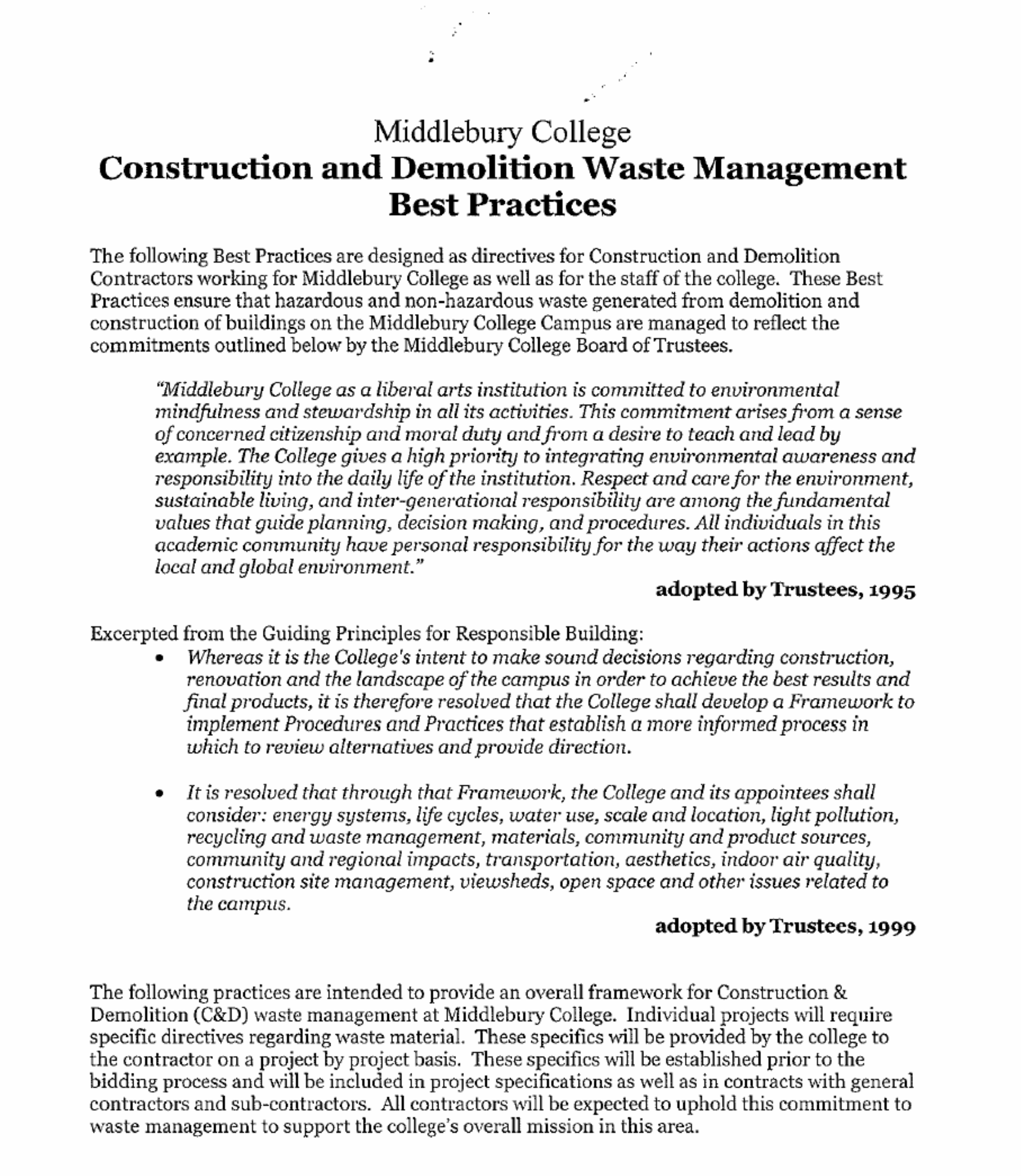


Strategy	Materials Targeted	Midrange Cost Per Ton	Cost Per Ton Range	Applicable Portion of the Waste Stream (Millions of Tons Per Year)	Strategy Description	Comments
Grasscycling [a]	Residential and commercial grass	$1.00	$0.26 to $7.04	14.0	Primarily education and promotion	A time-saving source reduction strategy for lawn care
Backyard composting [a]	Residential yard trimmings and food scraps	$12.90	$5.00 to $15.68	30.6	Education, promotion, and possibly bin distribution	Source reduction option for those with space to compost at home
Yard trimmings composting	Residential and commercial yard trimmings	$55.00	$21.65 to $88.21	28.0	Dedicated collection and processing of leaves, grass, and brush	Well established strategy
Onsite institutional composting	Institutional food scraps, select paper grades, and yard trimmings	$49.00	$29.00 to $98.00	2.4	Institutions, such as universities, correctional facilities, and military bases, collect and compost organic materials on site	Allows certain institutions to avoid high collection and disposal costs
Commercial composting	Food scraps and select paper grades	$72.00	$50.00 to $144.00	24.6	Dedicated collection of targeted materials; processing off site	Viable strategy for large commercial generators
Mixed waste composting	All commercial and residential organic waste	$113.00	$102.00 to $126.00	74.7	Standard garbage collection; separation of compostable waste at a single facility; composting of organic materials	Several facilities have closed due to technical problems
Residential source-separated composting	Select residential paper grades, food scraps, and select yard trimmings	NA	NA	47.3	Dedicated collection of targeted materials; processing at a central facility	Limited experience with this strategy in the United States

Notes:

[a] The labor required by citizens is donated at no cost to society.

Appendix E. Middlebury College Construction and Demolition Waste Management Best Practices



Middlebury College
Construction and Demolition Waste Management Best Practices

The following Best Practices are designed as directives for Construction and Demolition Contractors working for Middlebury College as well as for the staff of the college. These Best Practices ensure that hazardous and non-hazardous waste generated from demolition and construction of buildings on the Middlebury College Campus are managed to reflect the commitments outlined below by the Middlebury College Board of Trustees.

> *"Middlebury College as a liberal arts institution is committed to environmental mindfulness and stewardship in all its activities. This commitment arises from a sense of concerned citizenship and moral duty and from a desire to teach and lead by example. The College gives a high priority to integrating environmental awareness and responsibility into the daily life of the institution. Respect and care for the environment, sustainable living, and inter-generational responsibility are among the fundamental values that guide planning, decision making, and procedures. All individuals in this academic community have personal responsibility for the way their actions affect the local and global environment."*
>
> **adopted by Trustees, 1995**

Excerpted from the Guiding Principles for Responsible Building:

- *Whereas it is the College's intent to make sound decisions regarding construction, renovation and the landscape of the campus in order to achieve the best results and final products, it is therefore resolved that the College shall develop a Framework to implement Procedures and Practices that establish a more informed process in which to review alternatives and provide direction.*

- *It is resolved that through that Framework, the College and its appointees shall consider: energy systems, life cycles, water use, scale and location, light pollution, recycling and waste management, materials, community and product sources, community and regional impacts, transportation, aesthetics, indoor air quality, construction site management, viewsheds, open space and other issues related to the campus.*

adopted by Trustees, 1999

The following practices are intended to provide an overall framework for Construction & Demolition (C&D) waste management at Middlebury College. Individual projects will require specific directives regarding waste material. These specifics will be provided by the college to the contractor on a project by project basis. These specifics will be established prior to the bidding process and will be included in project specifications as well as in contracts with general contractors and sub-contractors. All contractors will be expected to uphold this commitment to waste management to support the college's overall mission in this area.

Practice 1 (if necessary): Pre-Demolition Audit

An audit will be conducted by staff of the college (and a hired contractor if necessary) prior to any demolition project. All materials within a site will be documented by both location (floor plan) and quantities. It will be determined through the audit whether any materials may be reused by architecture salvage operations, the college or private citizens. A walk through inspection will include someone with "salvage/reuse" expertise who understands the value and market for architectural and other salvage materials. At this time, it is necessary to assess the need for a hazardous waste abatement plan. If a plan is determined to be necessary, the section on hazardous waste in this document lays out the best practices for hazardous waste abatement.

The following questions will be used as a step-by-step guide for the pre-demolition audit. A plan will then be approved by college staff and communicated to all contractors.

- What can be re-used (reclaimed) right on site for new construction, i.e asphalt, glass, landscaping materials?
- Are there items of value to community, staff, alumni?
- Are there items (furniture, fixtures, moldings, mechanical equipment, etc.) which have immediate value to a secondary market?
- Are there hazardous wastes on site, i.e. is an abatement plan necessary?

Practice 2: C&D Waste Management by Material

At the onset and as needed (preferably again at the mid-point and at the end) during any C&D project at the college, a series of meetings will be held with Addison County Solid Waste District, college officials and all contractors to review expectations, rules and regulations which must be followed. A review of the consequences (Described in Practice 6) will also be included at these meetings.

The following is a material by material discussion and includes the action to be taken, the local contact for carrying out that action as well as future strategies to improve the management of the material.

Concrete, Asphalt, Brick
Current Action: Reclaim or Recycle

Cardboard
Current Action: Recycle, keep dry and clean
Contact: College program – Tom McGinn 443-5022
Special Consideration: Requires management on site to avoid contamination, specific management/information for cardboard will be included at initial project meeting.

Clean Wood (includes pallets)
Current Action: Recycle in separate containers labeled "clean wood"
Contact: Addison County Solid Waste District

Dirty Wood (plywood, painted, excessive amounts of fasteners)

Current Action: Recycle in C&D collection boxes
Contact: Addison County Solid Waste District

Clean Drywall (unpainted, free of fasteners)
Current Action: Recycle in C & D collection box
Contact: Addison County Solid Waste District

Metals (including aluminum, steel, fasteners, metal studs, etc.)
Current Action: Recycle in separate container
Contact: Collected by All Metals Recycling, Morrisville, VT or others

Doors, Plumbing Fixtures, Furniture
Current Action: Recycle in C&D waste collection box, if determined not salvageable through Pre-Demolition Audit.
Contact: Addison County Solid Waste District

Plastics
Current Action: Recycle.
Contact: College recycling program takes some containers

Beverage and Food Containers (glass, #1 and #2 plastic, aluminum)
Current Action: Recycle in provided containers
Contact: Existing college program

Hazardous Waste Management Best Practices

Practice 3: Abatement Plan

Should any contractor encounter hazardous waste during a project, a college official must be contacted immediately to ensure material is handled properly. Hazardous waste abatement contractors are hired for abatement of hazardous wastes by the college. The practice will include multiple sweeps of the site for removal of materials. College staff will participate to ensure hazardous materials are not overlooked that may be improperly labeled or located somewhere out of sight. Abatement contractors will be subject to the same quality control practices as outlined in the section on Quality Control and Consequences that applies to all C&D projects.

Practice 4: Hazardous Wastes accepted by ACSWD

The following lists makes explicit what is accepted by the local solid waste district and what is not. The list is updated periodically. The college and its contractors are ultimately responsible for the correct disposal of these materials. Non-compliance will result in consequences outlined in the section on Quality Control Best Practices that applies to all C&D projects.

Materials forbidden in trash, metal or C&D loads brought to the Addison County Solid Waste District Transfer Station:

- Free-flowing liquids of any kind
- Latex or oil-based paint, liquid or dried (truly dried latex can be landfilled)

- Paint-related products such as thinner or additive
- Pesticides
- Cleaning Chemicals, liquid or solid
- Pool Chemicals, liquid or solid
- Industrial/contractor-related chemicals including solvents, coatings, tars and adhesives
- Federally-listed hazardous wastes
- Vermont-listed hazardous wastes
- Friable asbestos
- Automotive chemicals (i.e. brake fluid, etc.)

The following materials are accepted at Addison County Solid Waste Management District transfer station if separated:

- Batteries, automotive and household
- Motor oil
- Empty pressurized cylinders (i.e. propane, welding gases)
- Fluorescent lightbulbs or fixtures containing PCB ballasts
- Mercury-containing thermostats, thermometers, barometers
- Appliances (charge of $3 per item - delivered separately)
- Non-friable asbestos is accepted for additional fee and the proper packaging
- Tires

Quality Control Best Practices

Practice 5: Contractor Accountability

At the onset of a C&D project, the contractor is required to issue a plan for handling materials outlined in Practice #2, as well as hazardous materials to be used on site. The plan will include:

- Material(s)
- List of Use(s)
- Materials Safety Data Sheets (if required)
- Storage on site
- Disposal plan/clean up at end

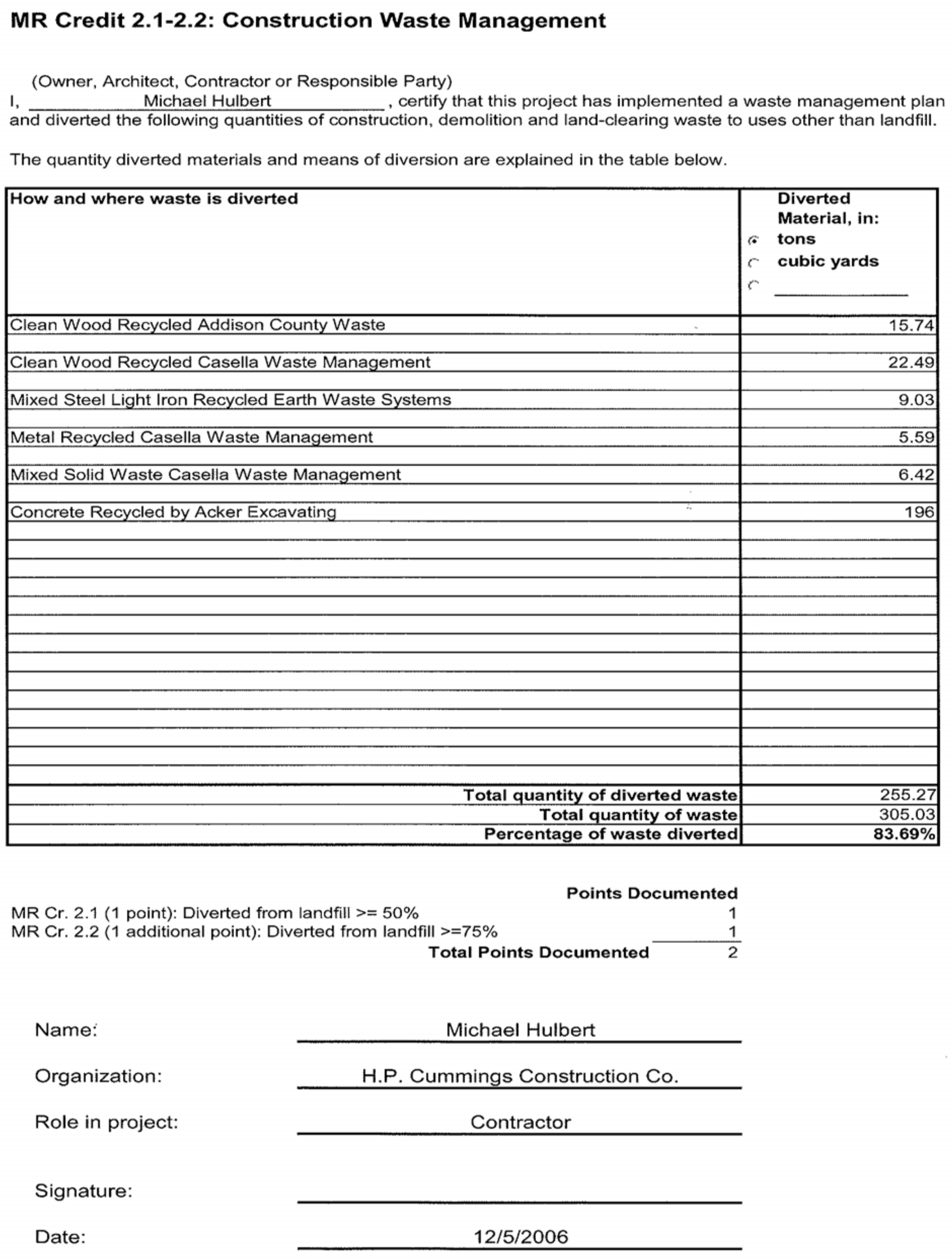
Documentation of proper management and disposal of all materials including hazardous is required before any payments will be released to contractors.

Practice 6: Consequences - Fine Structure

Failure to adhere to the practices outlined in this document will result in the following fines (as appears in contract):

1. $1,000 per incident fined by Middlebury College
2. Additional fines levied by outside parties (i.e. Addison County Solid Waste District, Clean Harbors, State of Vermont)
3. Cost of any cleanup plus 15%

Appendix F: Diversion Plan for the Hillcrest Project, Middlebury College



MR Credit 2.1-2.2: Construction Waste Management

(Owner, Architect, Contractor or Responsible Party)

I, Michael Hulbert , certify that this project has implemented a waste management plan and diverted the following quantities of construction, demolition and land-clearing waste to uses other than landfill.

The quantity diverted materials and means of diversion are explained in the table below.

How and where waste is diverted	**Diverted Material, in:** ● **tons** ○ **cubic yards** ○ ______
Clean Wood Recycled Addison County Waste	15.74
Clean Wood Recycled Casella Waste Management	22.49
Mixed Steel Light Iron Recycled Earth Waste Systems	9.03
Metal Recycled Casella Waste Management	5.59
Mixed Solid Waste Casella Waste Management	6.42
Concrete Recycled by Acker Excavating	196
Total quantity of diverted waste	255.27
Total quantity of waste	305.03
Percentage of waste diverted	**83.69%**

	Points Documented
MR Cr. 2.1 (1 point): Diverted from landfill >= 50%	1
MR Cr. 2.2 (1 additional point): Diverted from landfill >=75%	1
Total Points Documented	2

Name: Michael Hulbert

Organization: H.P. Cummings Construction Co.

Role in project: Contractor

Signature: ______

Date: 12/5/2006

Appendix G: Main Questionnaire

Main Questionnaire Overview

Background:

The Addison County Solid Waste Management District (ACSWMD) currently provides facilities for citizens of the county to responsibly dispose of much of their non-recyclable waste, such as hazardous materials, scrap metal, and electric appliances. They also strive to raise awareness among the citizens by outreach programs through their newsletter, programs at schools, tours of their facilities etc. This is aimed at a greater rate of diversion, of trash away from landfills, to move towards an ultimate goal of Zero Waste in the county.

Purpose of the questionnaire:

We created this questionnaire to measure awareness of the facilities & services offered by the ACSWMD, and the public opinion of practices—such as recycling and composting—necessary for an effective Zero Waste program. Specifically, this questionnaire aims to:

- Determine the geographic and demographic characteristics of all the respondents to establish which populations are least aware of these efforts; and for those households that responded favorably, to identify their incentives
- Determine how respondents dispose of their recyclables, non-recyclables, and organics
- Determine whether respondents use the facilities offered by the ACSWMD, and if not why
- Assess attitudes and measure reactions to practices such as recycling and composting
- Identify the main barriers cited by respondents for not recycling, composting, or participating in diversion programs

Participants in the questionnaire:

There will be a link to this survey on the ACSWMD's website, and if they have an emailing list, all those on the list will be notified of the online survey. The link to the questionnaire will also be in the next winter/spring ACSWMD newsletter, which will reach a much wider audience. For those citizens without internet access, a paper questionnaire will be mailed to them if they telephone the ACSWMD. The incentive to complete the survey will be five $20 vouchers to the Middlebury Natural Foods Co-op, which will not add unnecessary waste to the waste stream.

Results of the questionnaire:

We anticipate the results of this survey will identify specific areas or communities that need further incentives to work towards Zero Waste. We especially would like to identify the barriers people encounter when they attempt to recycle or compost. We also hope to identify incentives that have encouraged those individuals who do work towards Zero Waste. Finally, we expect that the survey will assess overall attitudes and levels of awareness in the county, and offer ACSWMD a clearer picture of where efforts have to be concentrated. These efforts will help Addison County be ready for a comprehensive Zero Waste program, and act as a model for other counties in Vermont.

Questionnaire

Moving to "Zero Waste" in Addison County

The Addison County Solid Waste District is reviewing its recycling and reuse programs. The District is exploring opportunities to continue to increase the diversion of solid waste into the recycling/reuse stream as well as reducing waste at the source. Please take a few minutes and tell us what you think about our recycling programs and how we can reduce our waste even further!

Thank you for your time!

General Recycling Questions

1. Do you have curbside pick up for your recyclables?
   Yes No

2. Do you separate you trash from you recyclables on a regular basis?
   Yes No

3. Have you ever brought any products to the transfer station for disposal?
   Yes No

4. Do you dispose of your kitchen food scraps in any way other then the garbage?
   Yes No

5. If you recycle, why? (select all that apply – if you choose more than one please rank them with 1 being the low and 3 the high)
   a. ___It saves money because it means you pay less for trash
   b. ___It is good for the earth
   c. ___No particular reason, it is just a habit

6. Where did you learn to recycle? (select all that apply)
   1) School
   2) Family
   3) Media (television, radio, magazines, etc.)
   4) Neighbor
   5) Peer/ Co-worker
   6) Don’t remember

Recycling Behaviors for Specific Products

(Please describe your recycling habits for the specific products by circling the option that best describes the frequency with which you recycle each product)

Items for Curbside Pickup

	Always	Frequently	Sometimes, when convenient	Rarely	Never, but I am aware of this service	Never, I was not aware this service exists
Newspaper	1	2	3	4	5	NA
Paper	1	2	3	4	5	NA
Corrugated Cardboard	1	2	3	4	5	NA
Plastics	1	2	3	4	5	NA
Aluminum Cans and Glass	1	2	3	4	5	NA

Items to be brought to the transfer station for safe disposal

	Always	Frequently	Sometimes, when convenient	Rarely	Never, but I am aware of this service	Never, I was not aware this service exists
Old Appliances	1	2	3	4	5	NA
Electronics	1	2	3	4	5	NA
Scrap Metal	1	2	3	4	5	NA
Chemicals or Cleaners	1	2	3	4	5	NA
Motor Fuel or Antifreeze	1	2	3	4	5	NA
Used Oil Filters	1	2	3	4	5	NA
Paint	1	2	3	4	5	NA

	Always	Frequently	Sometimes, when convenient	Rarely	Never, but I am aware of this service	Never, I was not aware this service exists
Propane Tanks	1	2	3	4	5	NA
Tires	1	2	3	4	5	NA
Batteries	1	2	3	4	5	NA
Incandescent or Fluorescent light Bulbs	1	2	3	4	5	NA

1. If you circled “No, but I am aware of the service” for any of the above products, please elaborate as to why by marking the statements below which most closely match your reasoning (if you select more than one, please rank them with 1 as the most significant reason and 8 the least)
    1) ___I don’t have time
    2) ___It is not a priority for me
    3) ___It is an inconvenience
    4) ___I do not believe there are really benefits to recycling
    5) ___I am not required to
    6) ___Many other people don’t do it, so I shouldn’t have to do it
    7) ___I am only one person, so my recycling habits are insignificant in the grand scheme of things
    8) ___Other reasons ___________________________________ (please specify)

2. Which of the below options would increase your participation in the local recycling and waste diversion options: (if you select more than one, please rank them with 1 as most significant and 5 the least)
    1) ___More convenient locations to drop off products
    2) ___Incentives for participation
    3) ___Disincentives for not participation
    4) ___Better information about where to dispose of household products
    5) ___Other suggestions____________________________________

Compostables and Yard Waste

Yard waste and vegetarian kitchen scraps also known as organics can also be recycled or composted. The District is interested to learn what you currently do with these wastes and whether you would be interested in learning more about recycling or composting these wastes.

1. What do you do with yard waste (i.e. leaves, garden clippings, grass clippings, etc.)? (circle all that apply)
   1) Nothing, you leave the leaves on the ground
   2) Bring them to the transfer station
   3) Store them in a pile on your land
   4) Dump them at a local forest or other location
   5) NA, you don't have any yard waste to deal with

2. What do you do your kitchen food scraps? (circle the one that best describes your normal action)
   1) Throw them in the garbage
   2) Compost them in a compost bin or pile on your property
   3) Bring them to the transfer station
   4) Put down the garbage disposal
   5) Other _____________________ (please specify)

3. If you circled '1) Throw them in the garbage', why?
   1) Composting is inconvenient
   2) Composting is time consuming
   3) Composting is unpleasant (i.e. smelly)
   4) Other_________________________ (please specify)

4. What might convince you to compost? (circle all that apply)
   1) More convenient locations to drop off products
   2) Incentives for participating
   3) Disincentives for not participating
   4) Better information about where to dispose of household products
   5) Other suggestions____________________________________

Demographics and Geographic Distribution

1. Which town do you live in? (please circle one)
   Addison, Bridport, Cornwall, Ferrisburgh, Goshen, Leicester,
   Lincoln, Middlebury, Monkton, New Haven, Orwell, Panton,
   Ripton, Shoreham, Starksboro, Vergennes, Waltham, Weybridge,
   Whiting.

2. How many people are in your household?
   1) Adults 18 or older: _____
   2) Elementary aged children 5-12
   3) High school
   4) Middle school
   5) Pre-school 3-5)
   6) 2 or younger:

3. How old are you?
   1) > 18 yrs
   2) 18 – 25 yrs
   3) 25-40 yrs
   4) 40-65 yrs
   5) < 65 yrs

4. How close to your home is the nearest transfer station? (please circle one)
   1) 5 miles
   2) 5 to 10 miles
   3) 10 to 20 miles
   4) 20 or more miles
   5) don't know

Appendix H. Restaurant Questionnaire

Restaurant Questionnaire Overview

Background:

This survey was created in order to review the current practices and attitudes towards composting by a representative sample of ten restaurants in Middlebury, VT. In addition, it aims at gauging restaurant receptiveness to a composting program that would be administered by a partnership between ACSWMD and Casella. The survey finally determines how much effort the restaurant would be willing to put into maintaining the high standards of waste separation which such a collaboration would necessitate.

Purpose of the questionnaire:

In addition to gaining a deeper understanding of the prevalent conceptions of composting among the restaurants in Middlebury by administering this survey, we hope to raise awareness of the possibility of a composting partnership. This would gauge the restaurant's receptiveness to the high standards of such a commitment, and hopefully their positive attitude to such an endeavor will convince ACSWMD to expedite their inclusion of restaurants into the current program with grocery stores.

Participants in the questionnaire:

The survey was administered to ten restaurants in Middlebury, selected at random. The names of the participating restaurants will not be disclosed. The results of this preliminary pilot of the restaurant survey tool are shared below.

Restaurant Questionnaire Results

For protection of privacy, “a)” through “j)” represent the 10 eating establishments surveyed.

1. Does this establishment separate compost from trash?

   a) Y [✓ N]
   b) [✓ Y] N
   c) [✓ Y] N
   d) Y [✓ N]
   e) Y [✓ N]
   f) Y [✓ N]
   g) Y [✓ N]
   h) [✓ Y] N
   i) Y [✓ N]
   j) Y [✓ N]

   If YES:
   - Why? What prompted you to continue this process?

     a) N/A
     b) It costs less and is environmentally friendly.
     c) We give it to a pig farmer and barter garden.
     d) N/A
     e) N/A
     f) N/A
     g) N/A
     h) We send it to a pig farm from where we get our sausages
     i) N/A
     j) N/A

   If NO:
   - What do you see as the main obstacle to separating trash and organics at this establishment?

     a) Lack of space.
     b) N/A
     c) N/A
     d) Lack of space.
     e) It might cost more or require more effort. Space is an issue.
     f) Don’t have the time to sort out compostables from napkins, straws etc. before we throw away stuff
     g) It takes a lot of time, this is a fast food restaurant
     h) N/A
     i) Lack of space & smell emitted
     j) No interested, no-one has ever brought it up

- What qualities of a program would make your establishment receptive?

  a) Don’t know
  b) N/A
  c) N/A
  d) Make it less of a painful process
  e) Not too receptive in general
  f) Nothing really
  g) If it was really easy & required
  h) N/A
  i) Can’t really think of any
  j) Don’t know

- Do you think an externally-implemented program would help motivate the employees?

  a) Always
  b) N/A
  c) N/A
  d) Yes.
  e) Maybe
  f) No
  g) Maybe – we need more education & to make it easier
  h) N/A
  i) Probably not – space & smell would still be an issue
  j) Maybe

2. Have there been any previous attempts or programs to compost in this establishment?

   a) [✓ Y] N
   b) Y [✓ N]
   c) Y [✓ N]
   d) Y [✓ N]
   e) Y [✓ N]
   f) Y [✓ N]
   g) Y [✓ N]
   h) Y N (Always composted)
   i) Y [✓ N]
   j) Y [✓ N]

If YES:

- What was the reason it was discontinued?

  a) Even though it was removed daily during the summer, it became a sanitary issue.
  b) N/A
  c) N/A
  d) N/A
  e) N/A
  f) N/A
  g) N/A
  h) N/A
  i) N/A
  j) N/A

- Would you be willing to re-attempt such a program?

  a) Don't know, but would be willing to supply vegetable oil free of cost to anyone who requires biofuel.
  b) N/A
  c) N/A
  d) N/A
  e) N/A
  f) N/A
  g) N/A
  h) N/A
  i) N/A
  j) N/A

3. When the employees are hired, is any training regarding separation of waste administered?

   a) [✓ Y] N (only recycling)
   b) [✓ Y] N
   c) [✓ Y] N (only the kitchen staff)
   d) Y [✓ N]
   e) Y N (maybe?)
   f) [✓ Y] N (recycling)
   g) Y [✓ N]
   h) [✓ Y] N
   i) Y [✓ N]
   j) Y [✓ N] (recycling)

4. What would you say the general attitude of your employees is, to the waste separation:

    - I. don't know anything about it
    - II. disinterested in learning about it
    - III. interested but there is not enough incentive
    - IV. interested and willing
    - V. other

    - a) III & IV
    - b) IV
    - c) IV
    - d) III & IV
    - e) III & IV
    - f) V – it has never been brought up
    - g) I – but employees would be willing if it was required by the job description
    - h) IV
    - i) V – they have never been asked
    - j) I – and maybe they would be interested if there was training

5. Do you think the following incentives would actually encourage employees to separate organics from trash:

    - I. A plaque for the restaurant
    - II. A grading system, for example, eco-stars, used in newspapers, ads, brochures etc
    - III. Individual employee benefits / incentives
    - IV. Other

    - a) None of the above would be necessary: the employees are genuinely conscientious
    - b) Yes
    - c) Yes
    - d) Maybe, it depends
    - e) Maybe. Relatively unsure and indifferent
    - f) No – it would be too difficult to get everyone to be interested
    - g) Maybe I & III
    - h) Yes – it would be great to get other restaurants involved
    - i) None
    - j) Yes – but it's easy not to so no-one is going to get too involved

6. Size of the operation:

I. Number of employees

a) 30 - 35
b) 7
c) 25 - 30
d) 20 - 25
e) 20
f) 6
g) 8
h) 30
i) 10
j) 25

II. Number of meals served / day

a) It varies, usually about 150
b) Unknown
c) Anywhere from 50-60 to over 200
d) About 70 in the winter and 200 in the summer
e) Don't know
f) Anywhere from 40 to 100
g) About 200
h) Anywhere between 100 to 200
i) Over 100
j) About 180

III. Number of years in operation

a) 4
b) 18 -20
c) Less than 1 year
d) 40 years in total, but 6 since it taken over by new owners
e) Less than 1 year
f) 20
g) 3
h) 4
i) 20
j) 25

IV. Type of restaurant

a) Sit-down
b) Bakery & Café
c) Sit-down.

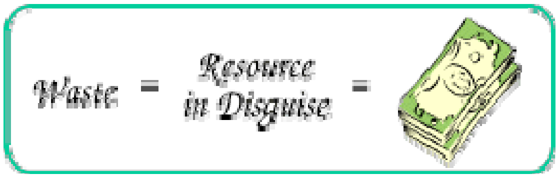
d) Sit-down
e) Market and Café
f) Bar & Restaurant
g) Sit down & Take-out
h) Sit-down
i) Sit-down & Take-out
j) Bar & Restaurant

Appendix I. Newsletter Article

Moving Towards Zero Waste

What is Zero Waste?

Zero Waste is founded on the belief that "waste" is not natural and represents a failure of our processes and products and a loss of money. The goal of Zero Waste is a 100% diversion rate of materials entering the landfill.



Zero Waste employs a full-systems view that focuses on: 1) recapturing resources from waste stream, 2) decreasing consumption, and 3) designing products more efficiently and for a full life-cycle. While the ACSWMD can effectively recapture resources from the waste stream once they have been produced, true progress towards Zero Waste requires reductions in consumer consumption as well as extended producer responsibility. Manufacturers can be held responsible for the waste their products produce and can commit to redesigning products and packaging for durability, reuse or recyclability.

Benefits of Zero Waste:

1) Minimizes environmental problems associated with resource extraction and waste disposal
2) Conserves natural resources
3) Strengthens companies and saves them money through more thoughtful design
4) Creates jobs in waste management
5) Saves money used for waste disposal

Sound impossible? It's not! Zero Waste programs are in place in communities and businesses throughout the world:

- City of San Francisco, CA
- Del Norte County, CA
- City of Seattle, WA
- Carrboro, NC
- Canberra, Australian Capital Territory
- Seven local councils in the UK
- 48 of the 74 Local Authorities in New Zealand
- Mad River Brewing in Northern CA (97% diversion rate)

Zero Waste strategies have been adopted by large and small businesses. The results have included **increased profits resulting from significant cost savings, improved environmental performance, and stronger local economies**. The following companies have reduced waste and improved efficiency through using Zero Waste strategies:

- Interface, Inc. in Atlanta, Georgia has eliminated over $165M in waste.
- Hewlett Packard in Roseville, California reduced its waste by 95% and saved $870,564 in 1998.
- Epson in Portland, Oregon has reduced its waste to zero and has saved $300,000.

What you can do:

- Educate yourself about the services and programs available in Addison County to dispose of your wastes properly.
- Use your purchasing power to support businesses that sell products that minimize waste production:
  - Choose to buy products with recycled content and less packaging
  - Choose quality products that can be repaired instead of cheap ones designed for obsolescence
  - Buy second hand goods.
- Compost! If you don't already, start composting food scraps and yard waste. Organics make up a majority of the waste stream and represent huge potential for waste reduction while producing valuable soil in the process.
- Lobby government leaders to support the banning of all organics from the landfill.
- Let ACSWMD know that you support Zero Waste and want to be involved in the process of developing a new plan for the District.

References Cited

ACSWMD. “Annual Report.” 2006.

Addison County Solid Waste Management District (ACSWMD). “Solid Waste Implementation Plan (SWIP).” June 2006. 22 September 2006. <http://www.acswmd.org/Final.SWIP.Master.Document.7.25.06.doc>.

Barnicle, Nadine. Personal communication. 2006.

Berry, Wendell. “The Work of Local Culture.” 1988. 12 September 2006. <http://www.schumachersociety.org/publications/essay_work_local.html>.

Carpet America Recovery Effort. 29 November 2006. <http://www.carpetrecovery.org/>.

Cedar Grove Composting. “Cedar Grove Organics Recycling.” 2003. 29 November 2006. <http://www.cedar-grove.com/organics/default.htm>.

Central Vermont Solid Waste Management District (CVSWMD). “Intro to Zero Waste.” October 2003. 27 September 2006. <http://www.cvswmd.org/pdf/ZWfactsheet.pdf>.

Central Vermont Solid Waste Management District (CVSWMD). “Solid Waste Implementation Plan (SWIP).” June 2003. 20 October 2006. <http://www.cvswmd.org/member_towns/solid_waste_plan.html>.

Connett, P. and Sheehan, B. “A Citizen’s Agenda for Zero Waste: A United States/Canadian Perspective.” GrassRoots Recycling Network. 2001. 28 October 2006. <http://www.grrn.org/zerowaste/community/activist/citizens_agenda_4_zw.html>.

“Construction and Demolition Waste landfills”. 1995. ICF Incorporated. 15 November 2006. <http://www.epa.gov/epaoswer/hazwaste/sqg/const/cdrpt.pdf>.

Earth Waste Systems. “Earth Waste Systems.” October 2006. <http://www.earthwastesystems.com/>.

Environmental Recovery & Consolidation Services LLC. “Carpet Recycling.” 26 October 2006. <http://www.carpetrecycling.com/index.htm>.

Friesen, B. 2000. “Landfill Ban Stimulates Composting Programs in Nova Scotia. Biocycle Magazine.” 2000. 6 November 2006. <http://www.jgpress.com/BCArticles/2000/030053.html>.

Grimley, Ed. 2006. Personal communication.

Henderson, Hazel. "Development Beyond Economism: Local Paths to Sustainable Development." In *People, Land, and Community: collected E.F. Schumacher Society Lectures*. New Haven: Yale University Press, 1997.

"King County launches campaign to improve business recycling rates." November 10, 2006. 12 November 2006. <http://dnr.metrokc.gov/dnrp/press/2006/1110business-recycling-campaign.htm>.

Kinsella, Susan and Knapp, Daniel. "GRRN Green Paper #1 – Zero Waste: Management Principles for the Coming Age of Zero Waste." Grassroots Recycling Network. 27 September 2006. <http://www.grrn.org/zerowaste/grrn1.html>.

Knowledge Without Boundaries, The Middlebury College Strategic Plan. 2006. 29 November 2006. <http://www.middlebury.edu/NR/rdonlyres/B83853CF-01C6-4C46-9453-A1BFA34B071D/0/MiddleburyStrategicPlan2006.pdf>.

Kuczynski, Teresa. 2006. Personal communication.

Liss, Gary. "What is Zero Waste?" Grassroots Recycling Network. 27 September 2006. <http://www.grrn.org/zerowaste/articles/whaztiszw.html>.

Lombardi, Eric. "Beyond Recycling! Zero Waste…or Darn Near." Grassroots Recycling Network. 31 October 2006. <http://www.grrn.org/zerowaste/articles/biocycle_zw_commentary.html>.

Maglienti, Don. 2006. Personal communication.

McDonough, William and Braungart, Michael. *Cradle to Cradle: Remaking the Way Things Work*. New York: North Point Press, 2002.

McGinn, Tom. 2006. Personal communication.

McKenzie-Mohr, Doug and Smith, William. "Fostering Sustainable Behavior: An Introduction to Community Based Social Marketing." 10 December 2006. <http://www.cbsm.com/members/world.lasso?user=121006.797645040483519334>.

Middlebury College. Facilities Services Newsletter, August 14, 2006.

Middlebury College. Hillcrest Construction Waste Management Plan, 2006.

Middlebury College Trustees. "Construction and Demolition Waste Management Best Practices. June 1995. <http://www.middlebury.edu/administration/enviro/policies/c_and_d_recycling_guidelines.htm>.

"MiddPoints." July 27, 2006. <http://www.middlebury.edu/NR/rdonlyres/FD05CDCA-2051-4361-A7B6-48A1F3BF55F3/0/July2706.pdf>.

Northeast Recycling Council, Inc. Carpet Discussion. September 28, 2006.

NYCORE Advancing Materials. 29 November 2006. <http://einnovationsinc.com/technology.html>.

Royte, Elizabeth. Garbage Land: On the Secret Trail of Trash. New York: Little, Brown & Company, 2005.

Shuman, Michael H. *Going Local*. New York: The Free Press, 1998.

Snow, Warren and Dickinson, Julie. "GETTING THERE! The Road to Zero Waste: Strategies for Sustainable Communities." Zero Waste New Zealand Trust. 22 October 2006. <http://www.zerowaste.co.nz/assets/Reports/roadtozerowaste150dpi.pdf >.

Snow, Warren and Dickinson, Julie. "The End of Waste: Zero Waste by 2020." New Zealand Zero Waste Trust. 22 October 2006. <http://www.zerowaste.co.nz/assets/Reports/TheEndofWaste.pdf>.

Tighe, Mark. 2006. Personal communication.

Toxic Action Center: Construction and Demolition (C&D) Debris, State by State.

US EPA. "Building Savings: Strategies for Waste Reduction of Construction and Demolition debris from Buildings". 2000. U.S. Environmental Protection Agency. 15 November 2006. <http://www.ilsr.org/recycling/buildingdebris.pdf>.

US EPA. "Characterization of Building Related Construction and Demolition Debris." Municipal and Industrial Solid Waste Division, Office of Solid Waste. June 1998. 24 October 2006. <http://www.epa.gov/epaoswer/hazwaste/sqg/c&d-rpt.pdf>.

US EPA. "Construction and Demolition (C&D) Debris: C&D Debris Disposal." February 2006. 24 October 2006. <http://www.epa.gov/epaoswer/non-hw/debris-new/disposal.htm>.

US EPA. "Educational Resources: Pack a Waste-Free Lunch." 12 October 2006. <http://www.epa.gov/epaoswer/education/lunch.htm>.

US EPA. "Flow Control and Municpal Solid Waste Executive Summary." September 1992. 8 December 2006. <http://www.epa.gov/epaoswer/non-hw/muncpl/flowctrl/report/execsum.pdf>.

US EPA. "Organic Materials Management Strategies." 1999. 23 October 2006. <http://www.epa.gov/epaoswer/non-hw/compost/omms.pdf>.

US EPA. “RCRA in Focus: Construction, Demolition, and Renovation.” September 2004. 24 October 2006. <http://www.epa.gov/epaoswer/hazwaste/id/infocus/rif-c&d.pdf>.

US EPA. “Recovering Organic Wastes—Giving Back To Mother Nature”. 1999. 28 October 2006. <www.epa.gov/wastewise>.

US EPA. “Value of Recovered Organic Materials.” 2000. 28 October 2006. <www.epa.gov>.